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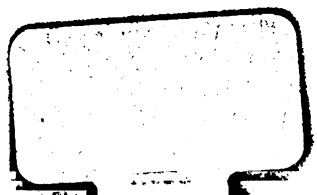

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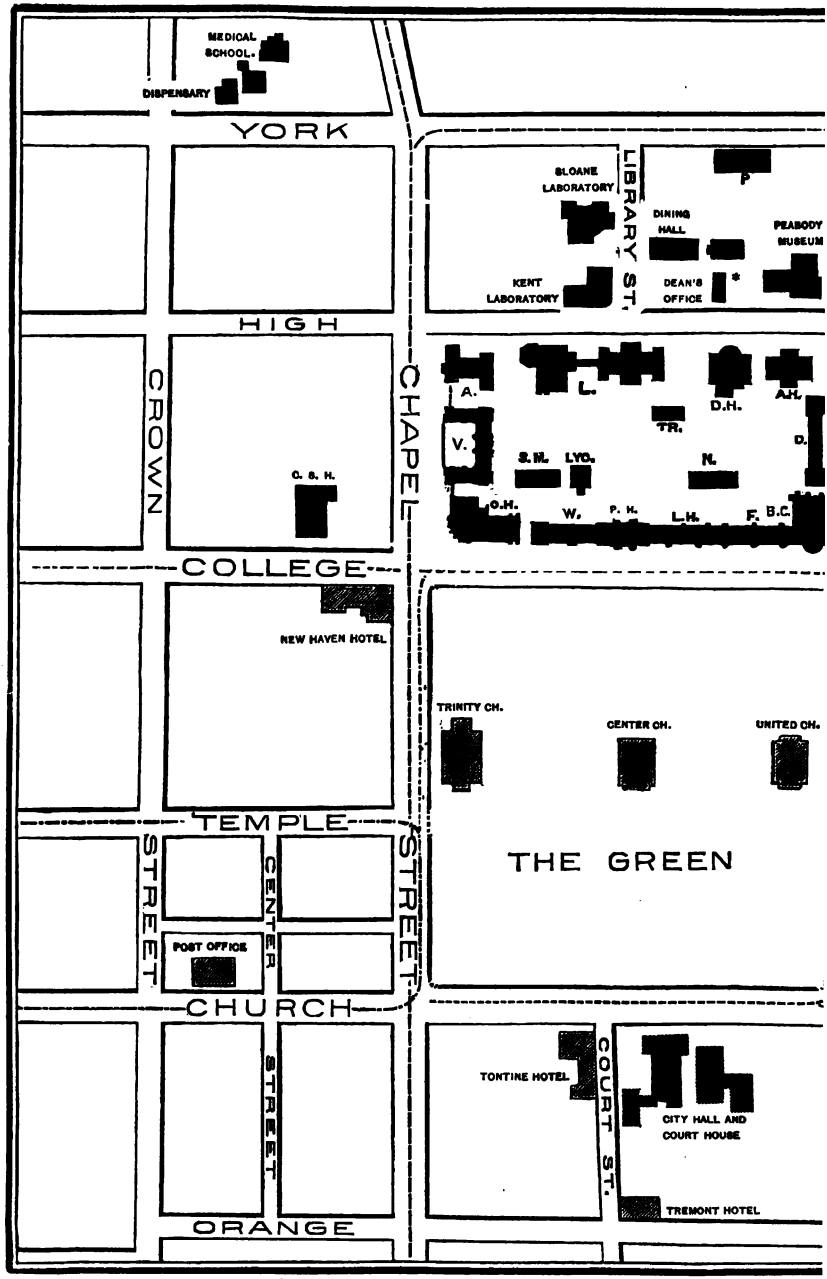

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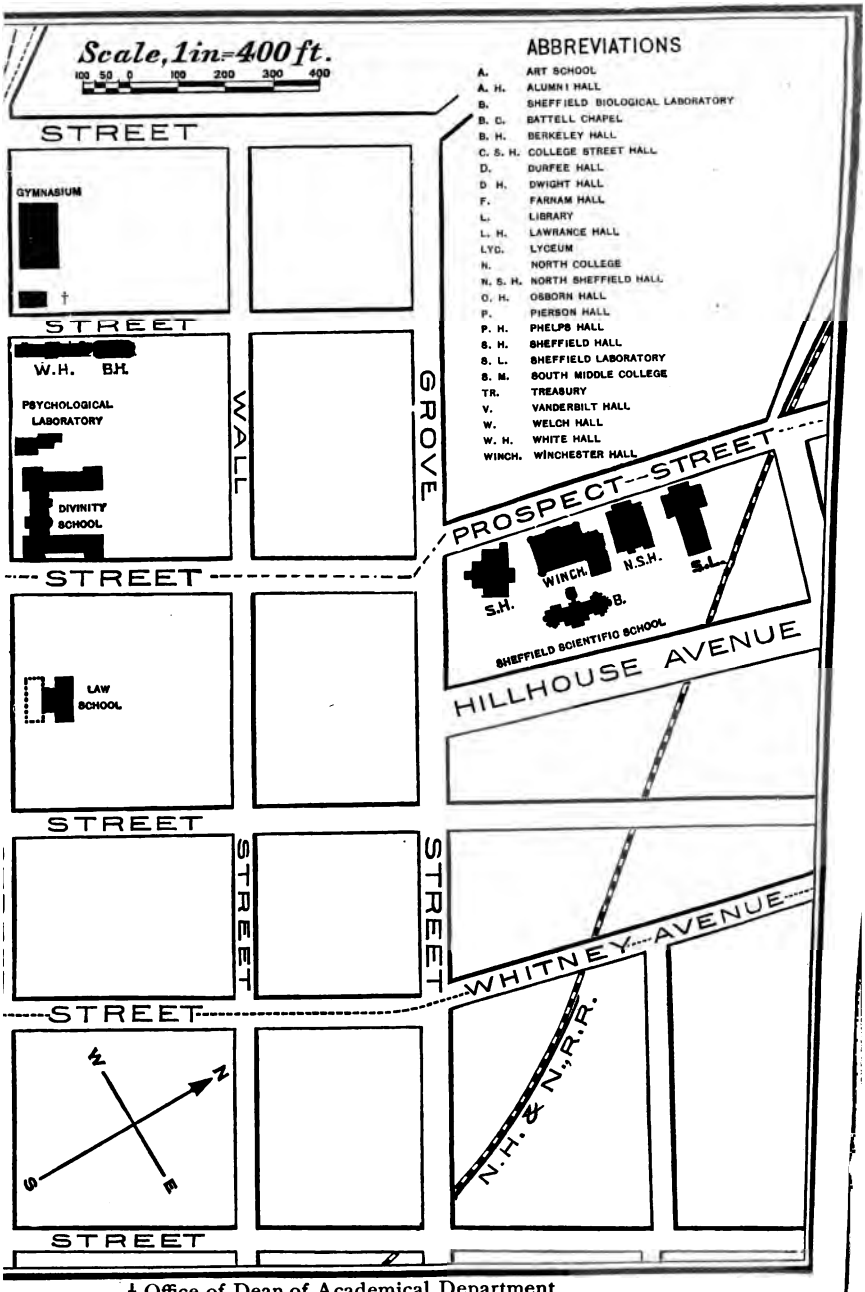

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GRADUATE SCHOOL

OF

YALE UNIVERSITY

COURSES OF INSTRUCTION

FOR

1897–98

NEW HAVEN:
1897

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CALENDAR

1897		
30 Sept.	Thursday	FIRST TERM begins.
24 Nov.	Wednesday	THANKSGIVING RECESS begins, 1.20 P. M.
26 Nov.	Friday	RECESS ends, 8 A. M.
22 Dec.	Wednesday	FIRST TERM ends.

Winter Vacation

1898		
11 Jan.	Tuesday	SECOND TERM begins.
31 March	Wednesday	SPRING RECESS begins, 1.20 P. M.
6 April	Thursday	RECESS ends, 8 A. M.
18 May	Wednesday	Anniversary of the Divinity School.
31 May	Tuesday	School of the Fine Arts, term ends.
26 June	Sunday	Baccalaureate Sermon.
29 June	Wednesday	COMMENCEMENT.

Summer Vacation

29 Sept.	Thursday	FIRST TERM begins.
21 Dec.	Wednesday	FIRST TERM ends.

For information with regard to the Graduate School, not contained in this pamphlet, and also with regard to Fellowships and Scholarships (see page 13), address the Dean,

Professor ANDREW W. PHILLIPS.

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GRADUATE SCHOOL

OF

YALE UNIVERSITY

FACULTY

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EDWARD G. BOURNE, PH. D., *Professor of History*
HORATIO W. PARKER, M.A., *Professor of Music*

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JOSEPH H. PRATT, PH.D., *Laboratory Assistant in Mineralogy*
ARTHUR L. WHEELER, PH.D., *Tutor in Latin*
WENDELL M. STRONG, M.A., *Tutor in Mathematics*
HARRY W. DUNNING, B.A., *Assistant in Semitic Languages*
GERVASE GREEN, B.A., *Lecturer on Philosophy*

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ADMINISTRATIVE COMMITTEE

WITH CONSULTATION HOURS

REV. TIMOTHY DWIGHT, D.D., LL.D., PRESIDENT,
Room 7, Treasury Building, daily, 10.30 A. M. to 12 M.

ANDREW W. PHILLIPS, PH.D., DEAN, *and Professor of Mathematics*
90 High street, daily, except Saturday, 2.30 to 4 P. M.

GEORGE J. BRUSH, LL.D., *Director of the Sheffield Scientific School*,
3 Sheffield Hall, daily, 10 A. M. to 12 M.

ARTHUR M. WHEELER, LL.D., *Professor of History*,
C_2 Osborn Hall, Monday and Friday, 10.30 A. M. to 12.30 P. M.

CHARLES B. RICHARDS, M.A., *Professor of Mechanical Engineering*,
112 Winchester Hall, 9 A. M. to 12 M., Wednesday and Saturday.

REV. GEORGE T. LADD, D.D., LL.D., *Professor of Philosophy*,
275 Lawrance, Wednesday and Saturday, 10 to 11 A. M.

THOMAS D. SEYMOUR, LL.D., *Professor of Greek*,
22 Phelps Hall, daily, 11 A. M. to 12 M.

ALBERT S. COOK, PH.D., L.H.D., *Professor of English*,
219 Bishop street, daily, 2 P. M.

HENRY W. FARNAM, R.P.D., *Professor of Political Economy*,
43 Hillhouse av., daily, 2 to 3 P. M.

RUSSELL H. CHITTENDEN, PH.D., *Professor of Physiological Chemistry*,
64 Sheffield Biological Laboratory, Monday, Tuesday, Wednesday, and Thursday, 9 A. M. to 12 M.

ARTHUR T. HADLEY, M.A., *Professor of Political Economy*,
E_2 Osborn Hall, Saturday, 10.30 A. M. to 1 P. M.

FRANK K. SANDERS, PH.D., *Professor of Biblical Literature*,
77 Mansfield st., daily, 2 to 3 P. M.

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GENERAL STATEMENT

ORGANIZATION

The Graduate School of Yale University forms a section of the Department of Philosophy and the Arts, which was first formally organized in 1847 for scientific and graduate instruction, but now includes Yale College, the Sheffield Scientific School, the Art School, and the Department of Music.

The degrees of Doctor of Philosophy and Civil Engineer were first offered in 1860, the degree of Dynamical or Mechanical Engineer in 1873, and that of Master of Arts (previously given without evidence of study) in 1874.

The professors in the several sections of the Department of Philosophy and the Arts together constitute the Faculty of the Graduate School. The general oversight of graduate instruction and graduate students is entrusted to the Dean and the Administrative Committee, who may be called upon for information and advice. Students are expected to report to the Dean soon after reaching New Haven.

ADMISSION AND REGISTRATION

Graduates of this and other Colleges and Universities, and (in exceptional cases, by special permission) other persons of liberal education, who are at least eighteen years old, are received as students for longer or shorter periods, with or without reference to the attainment of a degree.

All graduate students who are not regularly enrolled in any other department of the University, are required to register their names at the office of the Dean at the beginning of each year of study.

The degree of Doctor of Philosophy, with the courses of the Graduate School leading thereto, is open to candidates without distinction of sex.

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INSTRUCTION

Courses of study are offered in the following departments:

Psychology, Ethics, and Philosophy.
Political and Social Science, and History.
Semitic Languages and Biblical Literature.
Sanskrit, Linguistics, and Classical Philology.
Modern Languages and Literatures.
Natural and Physical Science.
Pure and Applied Mathematics.
The Fine Arts.
Music.
Physical Culture.

Instruction is given partly by lectures, partly by recitations and by oral and written discussions, partly by directing courses of reading, and partly by the direction of work in the laboratories and with instruments.

The attention of teachers who desire to fit themselves more thoroughly for a higher grade of professional work is called to the advantages offered by this department for pedagogical instruction and discipline. In addition to the special and advanced study of the subjects in which the graduate student desires instruction, and the pursuit of courses in psychology, ethics, philosophy, and of other courses cognate with pedagogy, opportunity is afforded to observe the actual practice in the class-room, as well as the organization of the different departments of the University and their methods of work.

CLUBS

In various voluntary associations, instructors and students meet together periodically for the reading of papers, oral discussions, etc.; such are:

The Classical Club.
The Mathematical Club.
The Political Science Club.

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THE PHILOSOPHICAL CLUB.
THE SEMITIC CLUB.
THE BIBLICAL CLUB.
THE MODERN LANGUAGE CLUB.
THE ENGLISH CLUB.
THE PHYSICS JOURNAL CLUB.
THE ENGINEERS' CLUB.
THE CHEMICAL CLUB.

FEES AND EXPENSES

The fee for instruction is generally one hundred dollars; but it may be more, or less, according to the courses pursued and the amount of instruction received.

A special fee of five dollars is charged to those who use the gymnasium, and of two dollars to those admitted to the use of the College Reading Room.

Board is obtained at prices varying from three and a half to eight dollars a week. The average price is under five dollars.

A list of suitable rooms is kept at the Dean's office.

LIBRARIES AND READING-ROOMS

Students have the free use of all the Libraries of the University. The whole number of volumes in the several libraries of the University is more than 250,000.

THE UNIVERSITY LIBRARY contains more than 200,000 volumes, and many thousands of unbound pamphlets. Its READING-ROOM contains the books most important for daily consultation and reference, together with scholarly periodicals. Of current periodical publications, including publications of learned societies, the Library receives an unusually large number,—the foreign serials alone being not less than five hundred.

THE LINONIAN AND BROTHERS LIBRARY contains about 20,000 volumes of the best current literature.

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THE COLLEGE READING-ROOM receives fifty-five daily newspapers, American and foreign, nearly sixty weeklies, and about eighty other periodicals—in addition to the periodicals received at the University Library. Graduate Students are admitted to the College Reading-Room on payment of an annual fee of two dollars.

THE SHEFFIELD SCIENTIFIC SCHOOL LIBRARY contains 6,000 volumes, largely mathematical.

THE ART SCHOOL LIBRARY contains about 500 volumes of expensive illustrated works.

THE LOWELL MASON LIBRARY contains 4,000 volumes of music.

The Peabody Museum, the Observatory, and the several Laboratories have valuable technical libraries.

Several of the departments of study (the Classical, English, Political Science, and Historical) have special libraries of standard works for the use of advanced students.

Dwight Hall, the headquarters of the Young Men's Christian Association, is provided with a good library and a pleasant reading-room, besides the halls used for religious meetings.

A parlor and study-room at 135 Elm street is fitted up for the special use of the women studying in the Graduate School.

LABORATORIES, MUSEUMS, AND COLLECTIONS

The Peabody Museum of Natural History.

The Physical, the Chemical, the Biological, and the Engineering Laboratories of the Sheffield Scientific School.

The Sloane Physical, the Kent Chemical, and the Psychological Laboratories of Yale College.

The collections of the School of Fine Arts.

The collection of coins in the University Library, and various collections of models, casts, and photographs used in the teaching of mathematics and in other departments of instruction.

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LECTURES AND CONCERTS

The following courses of public lectures and concerts are open to the students of the University:

THE SHEFFIELD COURSE.
THE ART COURSE.
THE THEOLOGICAL SCHOOL LECTURE COURSES.
THE DWIGHT HALL COURSE.
THE PHI BETA KAPPA COURSE.
THE KENT CLUB COURSE.
THE UNIVERSITY CHAMBER CONCERTS.
THE SYMPHONY ORCHESTRA CONCERTS.

DEGREES

THE DEGREE OF DOCTOR OF PHILOSOPHY is conferred upon those students who show the results of resident graduate work by a thesis giving evidence of high attainment and power of investigation, and by an examination on studies whose grade and amount meet the approval of the Faculty. Under ordinary circumstances two or more years' work will be required, but in certain exceptional cases work of equal grade at another University may take the place of a year's residence here. The thesis must be deposited at the Library for public inspection, not later than June 1. A good knowledge of Latin, German, and French is required in all cases, unless, for some very exceptional reasons, the candidate be excused by the Faculty. The fee for graduation is ten dollars. The fee for instruction is one hundred dollars.

THE DEGREE OF MASTER OF ARTS is conferred on Bachelors of Arts of Yale College (and upon Bachelors of Arts of other colleges who have pursued a course of study equivalent to that pursued in Yale College) of two years' standing or upwards, who have given to the College Faculty evidence of having made satisfactory progress in liberal studies after receiving their first degree. Such evi-

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dence may be furnished by one year's systematic study (not professional) in New Haven, under the direction of the College Faculty, followed by an examination. Graduates of other colleges can obtain the degree only by residence as thus described. Such Bachelors of Arts *of Yale College* as may not choose to reside at the College for the prosecution of study may show at any time, not less than three years after graduation, by their printed essays, or by submitting to special examinations, that they have spent a year in liberal (and non-professional) study, and are worthy of recommendation for this degree. In the case of resident students, the charge for instruction will usually be one hundred dollars, with a fee of ten dollars for the degree. In the case of non-residents the *application* for the degree must be accompanied by a fee of twenty-five dollars. An additional fee of ten dollars will be charged for the degree.

A committee of the Faculty is appointed (consisting for the present year of Professors Wheeler and Phillips), to whom candidates for this degree must submit their proposed courses of study for approval by the first of November in each year; and the evidence of a year's study must be submitted to the same committee by June 1.

The Degrees of Civil Engineer and Mechanical Engineer are conferred on Bachelors of Philosophy who have taken the first degree in Engineering study, and who pursue a higher course under the direction of the Governing Board of the Sheffield Scientific School for at least two years, sustaining a final examination, and giving evidence of their ability to design important constructions and to make the requisite drawings and calculations. The fee for graduation is five dollars.

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FELLOWSHIPS AND SCHOLARSHIPS

FIVE FELLOWSHIPS yielding four hundred dollars each, and twenty Scholarships yielding one hundred dollars each, have been created by the Corporation out of the income of University funds. These fellowships and scholarships are open to graduates of all colleges; but in the case of the fellowships, preference is given to those who have already spent at least one year in graduate study, and have shown capacity for original work. Candidates for these appointments should send their applications, accompanied by letters of recommendation and other evidences of the excellence of their work already accomplished, to the Dean, Professor Andrew W. Phillips, not later than May 1.

The Yale Alumni Association of California offers a Scholarship of three hundred dollars to a graduate of one of the California Universities pursuing studies at Yale in the Graduate School. The incumbent is selected by the Association.

COURSES OF INSTRUCTION

Courses marked with an asterisk (*) are undergraduate courses, but are open to graduate students, provided that they have the consent of the instructor and the approval of the Faculty.

The number of hours stated means, when not otherwise specified, hours of exercises, lectures, or recitations, each week through the year.

The hours named for the exercise are subject to change.

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COURSES OF INSTRUCTION

I. PSYCHOLOGY, ETHICS, AND PHILOSOPHY

GEORGE T. LADD, D.D., LL.D.
GEORGE M. DUNCAN, M.A.
EDWARD W. SCRIPTURE, Ph.D.
HENRY DAVIES, B.D.
GERVASE GREEN, B.A.
HENRY S. WILLIAMS, Ph.D.
E. HERSHEY SNEATH, Ph.D.
ARTHUR FAIRBANKS, Ph.D.
CARL E. SEASHORE, Ph.D.

Professor LADD :—

1 *Kant Seminary.* 2 hrs.

A rapid reading of Kant's Ethical Writings will be followed by a more careful study of the *Critique of Judgment* as a basis for discussing the principal conceptions in the philosophy of the beautiful. After an expository and critical lecture, a paper upon a topic given out some time in advance will be read, to be followed by discussion on the part of both teacher and class.

[Mondays, 7.15 to 9 P. M.]

2 *Metaphysics.*

The systematic and critical study will be undertaken of all those conceptions which enter into a Theory of Reality,—such as Space, Time, Causation, Energy, Relation, Quality, etc. Lotze's large work on Metaphysics will be used as a basis of the course, but the exercises will consist in the presentation and discussion of elaborate papers embodying the results of research by the class.

[Wednesdays, 3.15 to 5 P. M.]

*3 *Abnormal Psychology.* 1 hr.

This course is designed to supplement the other courses in Psychology and to discuss especially the physiological conditions and mental phenomena of sleep, dreams, and hypnotic, somnambulistic, and other allied states.

[Mondays, 3 P. M.]

Professors LADD and SNEATH :—

*4 *Theory and History of Ethics.* 2 hrs.

The principal topics in the philosophy of conduct—such as the nature and validity of moral consciousness, the freedom of

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will, and the nature and grounds of the morally right—will be discussed in a course of lectures. The historical part of the course will deal with the development of modern ethical thought as follows: The ethics of Hobbes and his critics—Cudworth, Clarke, Shaftesbury, and Butler; the development of utilitarian ethics from Locke to Mill; the development of evolutional ethics—special attention being given to the ethical system of Herbert Spencer; the progress of ethical thought in Germany from Kant to Schopenhauer.

[Mondays, 4 P. M., and Thursdays, 10.30 A. M.]

Professor DUNCAN :—

5 *Advanced Psychology.* 2 hrs.

This is a course in *General Psychology*, in which a detailed study is undertaken of the phenomena of mental life from the scientific point of view. Sully's *Human Mind* is read, with constant reference to Ladd's *Psychology, Descriptive and Explanatory*, James's *Principles of Psychology*, and the works of other leading modern authors; and the reading is accompanied by papers, discussions, and lectures.

[Wednesdays and Saturdays, 9.30 A. M.]

6 *Epistemology.* 1 hr.

The nature and conditions of formal truth will be studied in connection with the reading of an advanced work on logic, or Hobhouse's *Theory of Knowledge*. This will be followed by a study of the psychology of knowledge and by an examination of the nature, limits and grounds for the validity of our knowledge of reality. Professor Ladd's forthcoming treatise on the *Philosophy of Knowledge* will be read in connection with the latter part of the course. Students taking this course are recommended to take also Mr. Green's course in Advanced Logic.

[Thursdays, 9.30 A. M.]

Professor DUNCAN and Mr. GREEN :—

7 *Philosophy of Empiricism.* 2 hrs.

a. Locke's Essay concerning Human Understanding.

First half year.

(Professor DUNCAN.)

A careful study of this great classic of empiricism is undertaken and an attempt made to estimate its value and its influence upon subsequent thought. Professor Fraser's new critical

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edition of the Essay and Mr. Langley's translation of Leibnitz's *Critique of Locke* are used, and Leibnitz's criticisms are compared with those of the more important of Locke's other expounders and critics, such as Lee, *Anti-Scepticism*; Cousin, *Philosophy of Locke;* Green, *Introduction to Hume;* Webb, *Intellectualism of Locke*, etc.

b. Hume's Treatise on Human Nature. Second half year.

(Mr. GREEN.)

An examination of the destructive outcome of empiricism as exhibited in the speculations of Hume. Prof. T. H. Green's critical edition of the Treatise, or that of Selby-Bigge, will be used. The study of Hume may be preceded by the reading of Berkeley's *Principles of Human Knowledge* and be closed with a discussion of Hume's relation to subsequent British and German philosophy.

[Tuesdays and Fridays, 9.30 A. M.]

Professor DUNCAN :—

*8 *History of Modern Philosophy.* 2 hrs.

An elementary study of the development of speculative thought from Descartes to the present time, with cursory reading of philosophical masterpieces from Descartes to Kant. This course, while intended primarily for general culture, also aims to be an introduction to the more special study of philosophy in its various branches and problems.

[Wednesdays and Saturdays, 11.30 A. M.]

Professors H. S. WILLIAMS and DUNCAN :—

*9 *The Theory of Evolution.* 2 hrs.

a. Philosophy of Life and Organism. First half year.

(Professor H. S. WILLIAMS.)

A discussion of the facts and phenomena which underlie the modern theories of biological Evolution, and of the various forms of theory proposed to explain them.

b. The Philosophy of Evolution. Second half year.

(Professor DUNCAN.)

An examination of the Evolution Theory of Spencer in its metaphysical, psychological, and ethical aspects. This may be followed by the reading and discussion of some of the popular philosophical papers of Huxley, Tyndall, and Clifford.

[Tuesdays and Fridays, 9.30 A. M.]

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Assistant Professor SNEATH :—

10 *Philosophical Scepticism.* 2 hrs.

This course involves an historical and critical examination of scepticism with special reference to the construction of a theory of knowledge. It is divided into three parts as follows :

1. *Historical.* The work in this part of the course includes an examination of the nature of scepticism as revealed in the history of speculative thought. It involves a study of the scepticism of the Sophists ; the Earlier and Later Pyrrhonists ; the Middle and New Academies ; the scepticism of Augustine and Descartes ; of Hume and Kant ; the positivism of Comte, Mill, and Lewes ; the relativism of Hamilton and Mansel ; and the agnosticism of Spencer.

2. *Critical.* After considering the significance of scepticism, a careful examination is made into the causes and grounds of scepticism, special attention being given to sensationalism and error.

3. *Constructive.* This part of the course is devoted to a study of the psychology and philosophy of knowledge—to an inquiry into the nature, origin, validity, and extent of knowledge. The work is conducted in the Seminary method.

[Thursdays, 3.15–5 P. M.]

11 *Philosophy and Literature.* 1 hr.

This course will consider the nature and the problems of philosophy as presented in the writings of distinguished men of letters—those who have been called the " popular philosophers." The works of the following authors will be especially considered : Coleridge, Carlyle, Tennyson, Browning, and Matthew Arnold. The aim of the course will be to show what philosophy can do for the student of letters, and how the profounder aspects of thought may be presented in the attractive form of literature.

[Tuesdays, 9.30 A. M.]

12 *Philosophical Anthropology.* 2 hrs.

This course furnishes an outline study of man, his body and mind in their relations, his relations to nature, to his fellows, and to God ; and his development in history. The course is based upon Lotze's *Microcosmus*.

[Mondays and Fridays, 10.30 A. M.]

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Dr. SCRIPTURE :—

*13 *Physiological and Experimental Psychology.* 2 hrs.

An elementary course, consisting mainly of lectures, illustrated by physiological and psychological experiments, etc. Text-book : Ladd's *Outlines of Physiological Psychology.*

[Tuesdays and Thursdays, 2 P. M., Psychological Laboratory.]

*14 *Laboratory Course in Psychology.* 2 hrs.

Practical work in the laboratory, being an elementary course in psychological measurements.

This course can be taken only in connection with or in sequence to course 13.

[Mondays, 4 to 5.50 P. M., Psychological Laboratory.]

15 *Experimental Psychology ; advanced course.* 2 hrs.

General principles of experiment and measurement ; statistics, means, characteristic variations ; measurements of mental phenomena ; principles of laboratory instruction and economy ; practical training in psychological measurements and statistics with instruction in their adjustment ; construction and care of apparatus, etc.

[Wednesdays, 2 to 4 P. M.]

*16 *Educational Psychology.* 1 hr.

An elementary lecture-course in the psychological foundations of mental training and in the fundamental principles of teaching. The course is illustrated by experiments, etc., and by demonstrations of pedagogical material collected in America and Europe.

[Tuesdays, 5 P. M., Pyschological Laboratory.]

17 *Research-Work in Psychology.* 4 hrs.

Participants in this course are either investigators or assistants. For assistants the object is such a training in accurate introspection, observation, experimenting, and the art of research as is desirable for the general psychologist. This work is open to all. Only those who have had sufficient experience are permitted to undertake independent investigations. The results of all investigations belong to the archives of the laboratory. Those who undertake investigations thereby agree to prepare the results for publication, subject to approval, in the *Studies from the Yale Psychological Laboratory.*

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Dr. SEASHORE :—

18 *Experimental Psychology.* 1 hr.

An historical and critical study. The purpose of the course will be to give a brief statement of the attainments of this particular science by lectures, discussions, and readings according to the following general outline : (1) history, (2) present relation to other sciences and to philosophy, (3) methods, (4) some characteristic pieces of research, and (5) practical aspects. Characteristic sections will be read from Wundt's, Külpe's, Scripture's, Cattell's, and Yodl's recent psychologies. Reference in systematic bibliography.

*19 *Education.* 2 hrs.

A general course of lectures and readings on the history and theory of modern education. A brief exposition of the facts of mental development will be followed with a critical survey of the history of modern systems and a study of the present theory and practice with reference to these facts.

[Mondays and Fridays, 2 P. M.]

Dr. FAIRBANKS :—

20 *History of Religion.* 2 hrs.

The two main topics are, (*a*) the study of Semitic religions, in relation to the religion of Israel, and (*b*) the history of religion in India and Persia. Religion in China is also considered, in order that the course may meet the needs of students who are looking forward to mission work in China, in India, and among Mohammedan peoples. After a rapid survey of the sources of knowledge, the beliefs and rites of each religion are carefully studied, and the historic relation between them is examined. The constant aim is to trace some of the laws which govern the development of religion, and the factors which tend to aid or hinder its development.

Menzies' *History of Religion* will be read and discussed ; selections from the original documents will be read in translation ; and the more important archæological remains will be presented in illustrated lectures.

Mr. DAVIES :—

21 *Philosophy of the Early Christian Fathers.* 2 hrs.

This course of lectures comprises a detailed view of the development of Christian thought during the first three centuries. The object is to trace the philosophical influences which helped

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to modify Christianity during this period; to show how Christianity triumphed over heathen philosophy, and the beginnings of a Christian philosophy were made; and to estimate critically the value of these early results for modern thought.

22 *History of Aesthetics.* 1 hr.

The object of this course is to review the history of thought on the subject of the beautiful; to give a philosophical account of the foundations upon which the arts rest; and to study scientific art theory in its relation to general philosophical discipline. Mr. Bosanquet's *History of Aesthetics* will be read in connection with the course.

Mr. GREEN :—

23 *Advanced Logic.* 1 hr.

In this course Sigwart's *Logic* will be read and discussed, the object being to supplement the course in elementary Logic of Junior year, and to lay especial emphasis upon the nature of scientific method.

[Mondays, 9.30 A. M.]

*24 *History of Ancient and Mediæval Philosophy.* 2 hrs.

The aim of this course will be to furnish a general knowledge of the philosophical views of ancient and mediæval thinkers. In Greek philosophy special emphasis will be laid upon the views of Socrates, Plato, and Aristotle. Webster's *History of Philosophy* will be used as a basis.

[Mondays and Thursdays, 11.30 A. M.]

THE PHILOSOPHICAL CLUB is designed to afford opportunity both for comparison and discussion of views among all the students in this Department, and also for hearing addresses and papers from distinguished authorities on philosophical subjects, who are not connected with the Department as teachers. The customary meetings of the Club are fortnightly, on Thursday evening. All graduate students who take courses in philosophy are entitled to membership, on application; others may be admitted to membership by vote of the existing members.

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II. POLITICAL AND SOCIAL SCIENCE, AND HISTORY

EDWARD J. PHELPS, LL.D.
WILLIAM H. BREWER, Ph.D.
WILLIAM G. SUMNER, LL.D.
GEORGE B. ADAMS, Ph.D.
ARTHUR T. HADLEY, M.A.
EDWARD G. BOURNE, Ph.D.
EDWARD G. BUCKLAND, LL.B., M.A.
GEORGE L. FOX, M.A.
GEORGE P. FISHER, D.D., LL.D.
ARTHUR M. WHEELER, LL.D.
CHARLES H. SMITH, LL.D.
HENRY W. FARNAM, M.A., R.P.D.
WILLIAM F. BLACKMAN, Ph.D.
JOHN C. SCHWAB, Ph.D.
IRVING FISHER, Ph.D.
FREDERICK WELLS WILLIAMS, M.A.

POLITICAL AND SOCIAL SCIENCE

Professor SUMNER :—

1 *Politics and Finance in the History of the United States.* 2 hrs.

A critical examination of the current commonplaces of American history, and of the popular methods of treating it. Problems of colonization and the colonial relation; doctrines of commerce in the leading nations, 1774 to 1790; the federal government as inheritor of the difficulties of the mother country; philosophy of the American democratic-republic; inter-action of slavery, tariff, and currency; contributions of the United States to state-craft; the American banking system; land, immigration and labor, etc. Those who take this course are supposed to be well acquainted with the civil history of the United States.

[Not given in 1897–98.]

2 *Anthropology.* 1 hr.

A careful study of Ranke's *Der Mensch* (2d ed.), with an examination of the separate topics by means of all the appropriate material.

[Not given in 1897–98.]

3 *Systematic Societology.* 1 hr.

A continuance and extension of the course under 6 below. Spencer's *Principles of Sociology.*

[Not given in 1897–98.]

4 *The Industrial Revolution of the Renaissance Period.* 2 hrs.

A chapter in the history of the development of the industrial organization. The industrial element in the renaissance. The

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transition from mediæval to modern society in its causes, new elements, effects on classes, effects on economic doctrine. Changes imposed on the industrial organization; world commerce, land tenure, handicrafts, banking and money.

[Mondays, 10.30 A. M. ; Wednesdays, 9.30 A. M.]

5 *The Beginnings of the Industrial Organization.* 2 hrs.

An ethnological study of the industrial organization from its earliest beginnings. Division of labor between the sexes and the special functions of each; regulation of industry; slavery; formation of capital; discoveries and inventions; domestication of animals and plants; money, etc.

[Wednesdays and Thursdays, 10.30 to 11.20 A. M.]

*6 *The Science of Society.* 2 hrs.

An elementary course, with text-book lessons and examinations, in Anthropology and Ethnology, with the origin of civilization and the development of institutions.

In connection with this will be a course of lectures on Systematic Sociology [Societology]. This course is strictly academical both in subject and method, and does not take up topics popularly classed under "social science." Topics are: The organization of society; the individual and the social; social forces; militarism and industrialism; property; marriage, family, and the status of women; primitive notions in religion and philosophy; civil government, law and rights: slavery and classes; economic interests and their collisions; conditions of welfare; origin of moral standards; reaction of reason on experience. These topics are treated exclusively in the light of Historical Anthropology and Ethnology.

[Mondays and Thursdays, 8.30 A. M., A_1 O.]

*6a *The Science of Society.* 2 hrs.

A course with a German text-book (Lippert's *Kulturgeschichte;* 2 vols., Stuttgart, 1887), for those who are able to read difficult German. The exercises are coincident with those of course 6, including the lectures as above.

[Mondays and Thursdays, 8.30 A. M., A_1 O.]

Professor FARNAM :—

7 *Pauperism.* 2 hrs. 1st term.

An examination of the nature and causes of indigence, the history of efforts to deal with it, and some of the modern problems arising in connection with it.

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8 *The Modern Organization of Labor.* 2 hrs. 2d term.

These lectures treat of the historical antecedents and the development during the nineteenth century of associations of wage-receivers. They therefore include an account of the structures, aims, and methods of such societies in different countries, together with a discussion of their relations to socialism, the factory system, labor disputes, labor legislation, workingmen's insurance, provision for the unemployed, and other features of the modern industrial world.

[Mondays and Wednesdays, 11.30 A. M.]

9 *The Principles of Public Finance.* 2 hrs. 2d term.

A systematic survey of the means by which the expenditures of government are met, regard being had both to the economic principles involved and to the fiscal systems of modern states. Leading topics are: the budget, taxation (national and local), public debts, and state banks considered as aids to public credit.

[Not given in 1897–98.]

Professor HADLEY :—

10 *Economic Problems of Corporations.* 1 hr.

This course deals with the growth of combinations, trusts, and monopolies; the difficulties connected with private and with public management of such monopolies; the control of services rendered and prices charged; with especial reference, under the latter head, to the subject of railroad regulation.

[Thursdays, 12 M.]

11 *The Relation between Economics and Ethics.* 1 hr.

An historical study of the development of moral and legal standards in their relations to one another, followed by criticisms of various schemes of social policy and legislation. No one is admitted to this class who is not well grounded in the general principles of economics. The members of this class are expected to prepare critical papers as an essential part of the work of the class.

The topics treated in 1897–98 are wages, factory acts, foreign competition and its effects on labor, the eight-hour movement, strikes, arbitration, coöperation, government management of industry, schemes for the abolition or mitigation of poverty. In 1898–99 it is intended to treat the topics of sales, speculation, profits, interest, rent, currency, credit, monopolies, and commercial crises.

[Thursdays, 9.30 A. M.]

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*12 *History of Political and Economic Theory.* 1 hr.

For those who are making a special study of political science. The course is intended to serve as a guide to the technical literature of the subject and to show the relation of its different parts to one another.

[Wednesday, 9.30 A. M.]

*13 *Railroad Transportation.* 2 hrs.

An exhaustive investigation of the subject from the original sources. The work of this course will require that the student shall read French and German with ease.

[Tuesdays and Fridays, 11.30 A. M.]

Professors HADLEY and IRVING FISHER :—

*14 *Economics (General course).* 3 hrs.

A thorough course in the elements of the science. Two hours a week are devoted to text-book work with Professor Fisher, involving recitation-room drill in general principles. Professor Hadley lectures the third hour on the application of these principles to financial and industrial problems of the day.

Text-book : Hadley's *Economics.*

[Tuesdays, Wednesdays and Fridays, 11.30 A. M.]

Professor BLACKMAN :—

15 *Social Science.* 2 hrs.

A study of some important problems of American life, such as the negro ; the immigrant ; the defective, dependent, vicious and criminal classes (charities and corrections); the city ; the wage and factory system ; the family ; and communism, socialism and anarchism. The lectures will be supplemented by reports and book reviews by the students, and (probably) by a visit to the charity and correctional institutions of New York. In the latter part of the year a few lectures will be given on the study and literature of Sociology.

16 *An Historical and Sociological Study of Marriage and the Family.* 1 hr. 1st term.

Assistant Professor SCHWAB :—

17 *Finance.* 2 hrs.

An advanced course of lectures upon applied economics. The course covers the principles of money and credit, with illustrations from the monetary, banking, and financial history of

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the world, and of the United States in particular; it covers less minutely the subject of public finance, namely, the systems of government revenue and expenditure (see course 21 on United States Public Finance).

A third hour per week is devoted to a quiz-exercise, and is primarily intended for undergraduates, though graduates are admitted if they desire the additional instruction.

Books used: Jevons's *Money and the Mechanism of Exchange*, Dunbar's *Banking*, White's *Money and Banking*, Sumner's *Problems in Political Economy*, and *Investment Securities*, and Plehn's *Public Finance*.

[Mondays and Thursdays, 11.30 A. M.]

18 *United States Industrial History.* 2 hrs.

An advanced course of lectures upon the history of the tariff legislation and the industrial development of the United States, on the modern industrial organization, on corporations, the principles of international trade, and on the principles involved in investment securities.

As in course 16, a third hour per week is devoted to a quiz exercise, which, though primarily intended for undergraduates, is open to graduates if they desire the additional instruction.

Books used: Taussig's *Tariff History of the United States*, 1892, Bastable's *Commerce of Nations*, Hadley's *Railroad Transportation*, and perhaps von Halle's *Trusts*.

[Tuesdays and Fridays, 11.30 A. M.]

19 *United States Financial History.* 1 hr.

A shorter course than 17 on the principles of money and banking. Intended for those who take course 18 on *United States Industrial History*.

[Wednesdays, 11.30 A. M.]

20 *United States Industrial History.* 1 hr.

A shorter course than 18 on the Industrial History of the United States and the modern industrial system. Intended for those who take course 17 on *Finance*.

[Wednesdays, 12.30 P. M.]

21 *United States Public Finance.* 1 hr. 1st term.

A short course of lectures, applying the principles of public finance to the finances of the United States, federal, State, and local. Leading topics are: the sphere of expenditure and revenue of the different political units of the United States; their fiscal policy; an historical and critical study of their forms of revenue; the American system of State and local taxation in theory and in practice; State and local debt-financiering.

[Tuesdays, 10.30 A. M.]

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22 *The Finances of the Confederate States*, 1861–1865. 1 hr. 2d term.

A course of lectures on selected chapters from the financial history of the Confederate States. Leading topics will be: the tax versus the loan policy in the North and South during the Civil War; the inflation movement; constitutional questions involved in the war; the States-Rights and the Union sentiments in the South; the banks and the industries. These topics are treated from the standpoint of economic rather than political history. If desired, an opportunity is given for individual research.

[Tuesdays, 10.30 A. M.]

Assistant Professor IRVING FISHER :—

23 *Theory of Economics (advanced course).* 2 hrs.

This course is designed for those who wish to make a special study of economic principles and of the outlying problems of economic science. It is open only to those who have taken course 14 or its equivalent. Mathematical methods are employed where useful. As preparatory to the use of these methods, the course begins with lectures on elementary calculus. These are followed by the analysis of: I, value and prices; II, general price levels; III, effects of "appreciation" and "depreciation" with statistical discussion; IV, bimetallism and other currency schemes with especial reference to the experience of France, Austria, and India; V, international trade; VI, capital and interest; VII, distribution.

Cournot's *Investigations on the Mathematical Theory of Wealth* and Fisher's *Value and Prices* and *Appreciation and Interest* are used as a basis. Reading is also assigned in other works, especially recent investigations. Special papers are read by members of the class.

[Wednesdays and Saturdays, 10.30 A. M., E, O.]

24 *Vital Statistics and Life Insurance.* 2 hrs. first term.

The relations of statistics to the theory of population, the construction of life tables, and the laws of insurance.

[Wednesdays, 8.30, and Saturdays, 9.30 A. M.]

25 *Statistics (General).* 2 hrs. second term.

The sources and reliability of statistical data are discussed, and the methods of distinguishing true and false inferences are pointed out.

Mayo-Smith's *Statistics and Sociology* is used as a basis.

[Wednesdays, 8.30, and Saturdays, 9.30 A. M.]

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Professor E. J. PHELPS :—

*26 *Law.* 2 hrs. 2d term.

American constitutional law. International law. The instruction is by lectures based upon text-books to be read in connection. This course is not intended merely for those who are contemplating the study of the law as a profession, but for all who may be interested in the subject as a branch of general education.

[Fridays and Saturdays, 12.30 P. M.]

Assistant Professor BUCKLAND :—

*27 *Jurisprudence.* 2 hrs. 1st term.

The course consists of lectures and recitations on the following subjects: law in its relation to the origin, development, and government of political society; origin and development of customary law; relation of statute law to customary law; formation and development of codes of law; nature and origin of legal rights; principles of the law governing rights in land; principles of the law governing contract-rights; the law of remedies for the violation of rights; origin and procedure of courts of law and equity; criminal law. The instruction in this course is designed to present an historical and philosophical view of the law in its great outlines, as common to all nations, and as particularly developed in the Anglo-Saxon race. In addition it is designed to show the practical methods which obtain in modern commercial transactions and the law as applied to them, and to point out the principal rights acquired, the duties owed, and the liabilities incurred in the every-day conduct of affairs.

[Fridays and Saturdays, 12.30 P. M.]

Mr. FOX :—

28 *Comparative Municipal Government.* 1 hr.

The subject is treated from a practical rather than an historical point of view, and has a close relation to the future work of the student as a citizen. Some of the subjects considered are the sphere and functions of city government, existing and proposed; organization and methods of administration; relation to the higher legislature; attitude toward natural monopolies; sources of revenue and methods of expenditure. The leading types of American city government are described, together with a survey of European cities. Original reports upon city charters are required, and occasional debates are held on questions of municipal policy.

[Tuesdays, 4 or 5 P. M.]

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HISTORY

Professor BREWER :—

29 *Physical Geography in its relation to History.*
1 hr. 1st half of 2d term.

A course of about ten lectures discussing the following topics : the relations of man to the region he inhabits ; physical geography as related to the development of civilization ; natural aids to the defence and protection of communities ; natural facilities for commerce ; the effect of these several factors on the history of nations ; and the modification of these natural conditions by modern science and invention.

[Thursdays, 10.30 A. M.]

Professor WHEELER :—

30 *History of Treaties 1763–1815.* 1 hr.

31 *History of Institutions.* 2 hrs.

*32 *History of Europe since 1789.* 2 hrs.

Mainly political ; introductory to European politics of our day.

[Mondays and Thursdays, 12.30 P. M.]

33 *Investigation of special topics in European History from 1789 to 1815.* 1 hr.

A general knowledge of the period, and ability to read French or German easily, are required.

[Wednesdays, 11.30 A. M.]

Professor C. H. SMITH :—

34 *American History.* 2 hrs.

History of parties, and careers of party leaders until the death of President Taylor in 1850. For topical study and discussion by the class.

[Tuesdays, 10.30 to 12.20 A. M.]

35 *American History.* 2 hrs.

Political and constitutional history of the United States from the time when extension of slavery into the territories became a leading question until the close of the Reconstruction period in 1877. For topical study and discussion by the class.

[Thursdays, 8.30 to 10.30 A. M.]

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36 *American History.* 1 hr.

Formation and development of the Federal Constitution, with incidental consideration of the State constitutions.

A lecture course, with an examination at its close for those who are candidates for a degree.

[Tuesday, 9.30 A. M.]

Professor ADAMS :—

*37 *Mediæval History.* 2 hrs.

The object of this course is to furnish an outline of the general history of Europe, and to follow the development of political, intellectual, and religious civilization through the period which lies between ancient and modern history.

[Mondays and Thursdays, 11.30 A. M.]

38 *Mediæval Institutions.* 2 hrs.

This course extends through two years, and considers the most important European institutions between the fall of Rome and the sixteenth century. The student is made acquainted with the literature of the subjects treated and with the collections of original material. He is expected to investigate selected topics in the sources and to report to the class upon them, and especial attention is paid to the principles of criticism and to methods of research.

The first year's course (*a*) is given in 1897–98.

a. The first year's course will cover early German institutions; their modification under Roman influence; the development of the papal power and its special institutions; the institutions of Charlemagne's empire; the origin and the final forms of feudalism; and the beginnings of national governments.

b. In the second year's course especial attention is given to the growth of English institutions after the Norman conquest, the introduction of feudalism, the administrative system, the courts and the jury, taxation, parliament, and the limited monarchy. These are studied in comparison with the corresponding institutions of the continental states, and the similarities and differences will be noticed. Important continental institutions imperfectly or not at all represented in England are also studied.

[Course *b* is not given in 1897–98.]

Professors ADAMS and BOURNE :—

39 *Methods of Historical Research and Criticism.* 1 hr.

The first half of this course, under Professor Bourne, consists of lectures and discussions on the principles of historical

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criticism, for which Bernheim's *Lehrbuch der historischen Methode* will serve as an outline. The second half, under Professor Adams, consists of practical exercises in the study of selected historical documents, so arranged as to furnish examples of all the important points of method. The weekly exercises in this course may occupy two hours.

Students who take this course are advised to attend the early lectures of Professor Lang's course in Low Latin, course IV. 53.

[Mondays, 3 P. M.]

Professors ADAMS (first half-year) and —— —— (second half-year):—

*40 *English History.* [Seniors.] 3 hrs.

Political and constitutional. Particular attention will be given to the development of political and legal institutions. The more important constitutional documents will be discussed in detail as well as such other contemporary sources as are accessible. While this course is of special value to those who intend to study law, the interest of the general student also will be kept in view.

[Mondays, Wednesdays, and Thursdays, 10.30 A. M.]

Professor BOURNE.

*41 *American History (Colonial).* 2 hrs.

This course will deal with the history of the American Colonies from the beginning until the end of the American Revolution. The nature and objects of colonies, the character and aims of the colonists, the reaction of colonial interests upon Europe, and the causes of the Revolution will be the leading topics.

[Tuesdays and Fridays, 9.30 A. M.]

*42 *American History (National).* 2 hrs.

The Political History of the United States from 1783 to 1885. The rise and growth of parties, the development of democracy, the influence of the westward expansion and of slavery on political life, and the origin and significance of the more important economic questions will be discussed.

[Mondays and Thursdays, 9.30 A. M.]

43 *European Colonies in America.* 2 hrs.

A comparative study of the colonization of the New World. This course will begin with a brief review of mediæval commerce and of the impulses promoting the voyages of discovery. This will be followed by a more detailed study of representative colonies. The Spanish, French, and English colonies will be

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compared with each other and with their respective mother countries. In the latter part of the course the causes of the American Revolution and the downfall of the old colonial system will be examined.

[Tuesdays and Thursdays, 3 P. M.]

44 *Sources and Literature of American History.* 1 hr. 2d term.

Informal lectures followed by reports and criticisms by the class.

Professor ——— :—

45 *English History from the accession of the Tudors. Constitutional and political.* 2 hrs.

Especial attention is given to the Constitutional history of the Puritan Revolution. This course is designed for those who have a good knowledge of the general history.

The work consists in large part of a systematic study of the documents contained in Prothero's *Statutes and Documents*, 1559–1625, and Gardiner's *Constitutional Documents of the Puritan Revolution*, 1628–1660. The constitutional history of the earlier Tudors and of the period following the Restoration is covered in lectures and assigned readings. From time to time the students present reports on selected topics.

46 *Studies in German and French History.* 1 hr.

This course is designed for students who have a general knowledge of the history of modern Europe. The work of the class exercise is devoted to the discussion of topics illustrated in Schilling's *Quellenbuch zur Geschichte der Neuzeit*, and in Corréard's *Choix de Textes pour servir a l'étude des Institutions de la France*, and to papers by the students. A good reading knowledge of German or French is indispensable for this course.

Mr. F. W. WILLIAMS :—

*47. *Ancient Oriental Nations from the earliest times.* 2 hrs.

A comprehensive survey of the beginnings of civilization and its development in the principal nations of antiquity, including Babylonia, Assyria, Egypt, Phoenicia, and Media. This course illustrates the connection of Biblical and profane history, discusses the origins of political and social institutions, religions, the arts and sciences, and the Asiatic source of European civilization, and constitutes an introduction to the study of history.

[Mondays and Thursdays, 12.30 P. M.]

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*48 *Modern Asiatic History.* 2 hrs.

A course embracing successively the regions of India, Japan, China, and Central Asia, with particular regard to their history since the 17th century, their governments, and their relations with European powers. The culture, faiths, and sociology of existing nations in the Far East are here considered with the view of interesting those whose historical knowledge is confined to the Western world. The course is designed to stimulate further reading by students in special topics suggested by the instructor, upon which written essays will be presented and discussed. It also offers an opportunity for those contemplating missionary careers to acquaint themselves with the political and social condition of the more important foreign missionary fields.

[Tuesdays and Wednesdays, 12.30 P M.]

The following course in the Divinity School is also open, by the special permission of Professor Fisher, to graduate students:

Professor GEORGE P. FISHER:—

49 *General Church History.* 3 hrs.

This course comprises the following topics: The nature, divisions, and sources of Church History, with a review of the literature on the subject; the old or preparatory dispensation in its relation to Christianity; the condition of the Graeco-Roman world at the introduction of the Gospel; the establishment of Christianity, and the conflicts of the apostolic age; the spread of Christianity, including especially the conversion of the Roman Empire and of the Teutonic nations; the changes in ecclesiastical polity in the early centuries; the organization of Latin Christianity under the Papacy; the relations of the Papacy and the Church to civil society in the Middle Ages; the Protestant Reformation, with its causes and the systems of polity adopted by the different Protestant churches; Christian life, and its characteristic features in the successive eras (including the rise and subsequent history of monasticism); the history of Christian worship.

[Mondays, Thursdays, and Saturdays, A. M.]

For courses on the Greek and Roman Historians, see Classical Philology, iv, courses 8, 9, 30, and 39. For a course in Roman Law, see iv, 55.

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50 *Historical Seminary.*

An advanced course in the methods of historical research is conducted by the professors of History. The members of the course prepare papers upon topics selected with especial reference to the possibility of a comparatively brief treatment based upon a full examination of the existing sources. The opening sessions of the year are devoted to bibliographical work, and to questions of difficulty which may arise in the preparation of the papers. The later sessions are occupied with the reading of the papers and their criticism by the members of the course and by the professor in whose department the topic falls. This criticism has especial reference to the handling of the sources, the constructive method employed, and the validity of the results. The members of this course must have taken course 39 or show an equivalent preparation.

THE POLITICAL SCIENCE CLUB meets fortnightly for the reading and discussion of papers, and for reports on current literature. A convenient room in White Hall (No. 11) is set apart for its use, and contains a departmental library which is accessible to the graduate students at all hours of the day. As the books are not allowed to be taken from the room, this library is particularly helpful to graduate students when they wish to refer to some authority which is temporarily withdrawn from the University library.

THE HISTORICAL SEMINARY ROOM, No. 10 White Hall, contains a reference library to which graduate students may have access at all hours. This library will contain more than a thousand volumes at the opening of the next year.

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III. SEMITIC LANGUAGES AND BIBLICAL LITERATURE

EDWARD L. CURTIS, Ph.D., D.D. FRANK C. PORTER, Ph.D.
BENJAMIN W. BACON, Litt. D., D.D. FRANK K. SANDERS, Ph.D.
HARRY W. DUNNING, B.A.

Professor SANDERS :—

*1 *Hebrew Poetry, Law, History, and Prophecy.* 2 hrs.
[Tuesdays and Wednesdays, 10.30 A.M., 184 Lyc.]

2 *Hebrew Syntax.* 1 hr.
A careful study of the principles of Syntax, making class-room use of Harper's *Elements of Hebrew Syntax*, and of Driver's *Tenses*, with references to other authorities, and with some attention to comparative Syntax. During the year a variety of passages in the Bible will be read critically with reference to a syntactical interpretation.
[Omitted in 1897–98.]

3 *Textual Criticism of the Old Testament.* 1 hr. both terms.
A close textual study of some one of the Minor Prophets, making use of the apparatus of the lower criticism to restore the original text. At the beginning and at the close of the year's work lectures are given on the apparatus, methods, and history of O. T. criticism.
[Tuesdays, 3 P. M.]

4 *Arabic Poetical and Philosophical Literature.* 2 hrs.
The first half of the year is devoted to the *Mu'allaqât* and other poetical literature, read both with and without the unpointed commentary. In the second half of the year the class makes constant use of the valuable Salisbury collection of mss. and texts in the University library. Lectures on Arabic literature are given at intervals throughout the year.
[Tuesdays, 8.30–10.30 A. M.]

*5 *Biblical Literature.* 2 hrs.
A survey of the whole Bible in English from an historical and literary standpoint, the material being arranged, as far as possible, on the principle of chronological and historical connection.

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The course aims to promote (1) a classified and organized grasp of the contents of the English Bible, (2) a realization of the historical position and significance of the Hebrew people as a Western Asiatic and Semitic race from the earliest times to the fall of Jerusalem, A. D. 70, (3) an appreciation of the Bible as literature and as a literary whole, (4) an intelligent attitude towards the various problems raised by Biblical criticism. It is a two years' course, but may be begun in either year.

The first year's course is given in 1897–98.

a. The first year's course is a study of Old Testament history and literature closing with the Exile, including the *Hexateuch*, the Historical books through *II Kings*, the pre-exilic *Prophets*, *Proverbs*, the *Song of Songs*, and portions of the *Psalter*. Much attention is paid to the assured results of Oriental exploration and to Western Asiatic history in so far as relates to the Bible.

[Wednesdays and Saturdays, 10.30 A. M.]

6 *English Bible Seminary.* 2 hrs.

An investigation course, intended to train men for patient and accurate investigation of Biblical questions. Various topics are considered. During 1896–97 the principal subject was the critical survey of post-exilic literature.

The course is very informal, the class meeting at regular intervals to report and compare results of individual study of themes assigned by the instructor.

[Tuesdays, 4–6 P. M.]

7 *The Minor Prophets* (English). 1 hr.

A careful study of each of the Minor Prophets taken in chronological order, in connection with the survey of the general subject of Prophecy.

[Mondays, 2 P. M.]

8 *The Three Major Prophets* (English). 1 hr.

[Omitted in 1897–98.]

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9 *Beginning Assyrian.* 2 hrs.

The year's work includes the mastery of the more common cuneiform signs, the principles of the language, the rapid reading of much transliterated material, the careful reading of selected portions of the texts of Tiglathpileser, Shalmaneser, and Sennacherib in the cuneiform, together with lectures on the outlines of Assyro-Babylonian history and literature.

[Thursdays and Fridays, 5 P. M.]

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10 *Assyrian and Babylonian Inscriptions.* 2 hrs. 1st half year.

Selected inscriptions from the annals of the later Assyrian kings, and of the Neo-Babylonian empire, the Creation and Deluge tablets, etc.

[Mondays, 3 P. M., and Fridays, 3.15 P. M.]

11 *Assyro-Babylonian History and Literature.*

2 hrs. 2d half year.

A rapid reading with the use of Schrader's transliterated texts of the whole range of Babylonian and Assyrian historical inscriptions, the object being to gain a familiarity with the literature and the history, and a critical estimate of the relation of one to the other.

[Thursdays, 8.30–10.30 A. M.]

12 *Ethiopic.* 2 hrs. 1st term.

A survey of the elements and distinctive structure of the Ethiopic, using Praetorius's *Äthiopische Grammatik* and referring to Dillmann, and reading some portions of the chrestomathy and one or two of Bachmann's texts.

[Fridays, 10.30–12.30.]

13 *Comparative Semitic Grammar.* 2 hrs. 2d term.

The reading and discussion of Wright's *Comparative Grammar*, special themes being presented in lectures and class-papers.

[Fridays, 10.30–12.30.]

14 *Semitic Seminary.* 2 hrs.

An investigation course for the acquisition of methods in linguistic research.

[Monday evenings, every two weeks.]

15 *The Book of Jeremiah* (Hebrew). 1 hr.

The rapid reading of the book of Jeremiah in Hebrew with an interpretation of the contents having special reference to its historical setting and chronological sequence, and to the principles of prophecy.

16 *The Book of Ezekiel.* 1 hr.

[Omitted in 1897–98.]

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Mr. H. W. DUNNING :—

17 *Sight-Reading in Hebrew.* 1 hr.

The class reads at least two hours each week, but the work counts as the equivalent of one hour. Special attention is paid to the acquisition of a working vocabulary. The first term is devoted to historical prose, the second to selections from the prophets, the third to wisdom or poetic literature. If circumstances admit, a special division will be formed of those capable of unusually rapid work.

[Wednesdays, 4–6 P. M.]

18 *Beginning Arabic.* 2 hrs.

During the first term the principles of the language are mastered in connection with the careful reading of *Genesis i-iii.* During the second term the class reads rapidly in historical prose.

[Tuesdays and Thursdays, 2 P. M.]

19 *The Qur'ân.* 2 hrs. 1st half year.

Interpretation of the early Meccan suras and of selections from those of other periods, accompanied by a study of the life of Muhammad.

[Wednesdays and Fridays, 10.30 A. M.]

20 *Arabic Prose Literature.* 2 hrs. 2d half year.

A rapid reading of selections from the Arab historians and from the *Thousand and One Nights*, followed by a close study of the *'Ajurrâmiya* or the *Kitâb al Aghâni.* Lectures are given on the history of Islâm.

[Wednesdays and Fridays, 10.30 A. M.]

21 *Biblical Aramaic.* 2 hrs. 1st half year.

A study of the elements of Aramaic, with a reading of the Aramaic portions of the Scriptures and of selections from the Targums.

[Tuesdays and Thursdays, 5 P. M.]

22 *Syriac and the Textual Criticism of the New Testament.* 2 hrs. 2d half year.

The principles of the language, using Nestle's *Syriac Grammar*, followed by reading in the Syriac New Testament. This course is intended as an introduction to New Testament textual criticism, and lectures will be given on its apparatus and methods.

[Tuesdays and Thursdays, 5 P. M.]

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23 *Old Testament Wisdom-Literature* (English). 1 hr.
A study of the books of Job, Ecclesiastes, Proverbs and the Song of Songs in connection with a survey of the character, development and leading positions of Hebrew speculative thought.
[Wednesday, 2 P. M.]

24 *Messianic Prophecy* (English). 1 hr.
[Omitted in 1897–98.]

The following courses, given primarily for students in the Yale Divinity School, are open to graduate students:

Professor CURTIS:—

25 *The Hebrew Psalter.* 1 hr.
A critical reading of the text of the Psalms, using Wellhausen's edition in the Haupt *Polychrome Hebrew Bible.*
[Thursdays, 5–6 P. M.]

26 *The Book of Job.* 1 hr.
Grammatical and historical exegesis of the Hebrew text. (Lectures and recitations.)

27 *The Five Megilloth.* 1 hr.
Grammatical and historical exegesis of the Hebrew text. (Lectures and recitations.)
[Omitted in 1897–98.]

28 *Selections from the Psalter.* 2 hrs. 1st term.
Grammatical and historical exegesis of the Hebrew text, with special reference to New Testament interpretation and modern homiletical application.
[Wednesdays and Fridays, 9.30 A. M.]

29 *The Book of Isaiah.* 1 hr. 2d term.
Grammatical and historical exegesis of the Hebrew text.
[Wednesdays, 9.30 A. M.]

30 *Analysis and Exposition of Isaiah, Jeremiah, and Ezekiel.* (English Bible.) 2 hrs. 2d term.
[Tuesdays and Fridays, 9.30 A. M.]

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31 *Old Testament Introduction.* 1 hr.

A brief survey of the history of the canon, text, and versions, followed by special introduction to the Hexateuch and remaining Old Testament books. Lectures.

[Mondays, 11 A. M.]

Professor PORTER :—

32 *Biblical Theology of the Old Testament.* 2 hrs.

A general view of the religious institutions and of the ethical and religious conceptions of Israel in their beginnings, and in the historical course of their development.

[Tuesdays, 9.30 A. M., Thursdays, 8.25 A. M.]

33 *Biblical Theology of the New Testament.* 3 hrs.

An examination of the teaching of Jesus and of the different types of apostolic teaching in their historical character and in their relations to one another and to the religious ideas of the time.

[Wednesdays and Fridays, 9.30 A. M., and Thursdays, 11 A. M.]

34 *Hellenistic Jewish Literature.* 1 hr.

Readings from the early Hellenistic literature and from Philo, with special reference to the relation of Hellenistic to Palestinian Judaism and its influence upon early Christian thought.

35 *Palestinian Jewish Literature.* 1 hr.

A course similar in purpose and method to course 34.

[Omitted in 1897–98.]

36 *Judaism in New Testament Times.* 2 hrs.

An historical seminary for the study of special problems in the History and Theology of Judaism in New Testament Times.

Dr. BACON :—

37 *The History of New Testament Literature.* 2 hrs.

Mondays, lectures on special introduction to the several New Testament books. Thursdays, critical readings of the Book of Acts with application of the principles of historical and documentary criticism.

[Mondays and Thursdays, 9.30 A. M.]

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38 *The Teachings of Jesus.* 2 hrs.

Comparison of the Synoptic and Johannine tradition in the light of contemporary Jewish teaching. Theses by the class.

[Tuesdays and Thursdays, 12 M.]

[See also Dr. Fairbanks's courses in Hellenistic Greek iv. 32, and Greek Worship and Belief, iv. 33.]

THE SEMITIC CLUB is composed of the above-mentioned instructors and of students who are qualified for independent work. Its meetings are held at regular intervals throughout the year. During 1896–97 the general subject of study has been the Mishna. It is probable that Rabbinic Literature will be taken up for 1897–98.

THE BIBLICAL CLUB draws its members from the students of the department of Biblical Literature and of the Divinity School. It holds stated monthly meetings, at which papers on subjects of interest to Biblical students are presented and discussed. The general subject of investigation for 1896–97 was Apocryphal and Pseudepigraphic Literature. For 1897–98 a more miscellaneous program will be followed, including topics relating to the archæological, canonical, textual, and general history of the Bible.

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IV. CLASSICAL PHILOLOGY, SANSKRIT AND LINGUISTICS

TRACY PECK, M.A.
BERNADOTTE PERRIN, Ph.D., LL.D.
EDWARD P. MORRIS, M.A.
EDWARD W. HOPKINS, Ph.D.
HORATIO M. REYNOLDS, M.A.
JAMES J. ROBINSON, Ph.D.
CARLETON L. BROWNSON, B.A.
GUY V. THOMPSON, Ph.D.
ARTHUR L. WHEELER, Ph.D.
HENRY P. WRIGHT, Ph.D., LL.D.
THOMAS D. SEYMOUR, LL.D.
HENRY R. LANG, Ph.D.
THOMAS D. GOODELL, Ph.D.
CORNELIUS L. KITCHEL, M.A.
ARTHUR FAIRBANKS, Ph.D.
HANNS OERTEL, Ph.D.
JAMES W. D. INGERSOLL, Ph.D.

SANSKRIT AND LINGUISTICS.

Professor HOPKINS:—

1 *Elementary Sanskrit.* 3 hrs.
Instruction in Sanskrit, beginning with Whitney's *Sanskrit Grammar*, and passing on to Lanman's *Reader*. Exercises in composition.

2 *Advanced Sanskrit.* 3 hrs.
Selections from the Rig Veda and Brahmanic texts. The mss. and texts of the University library and of the American Oriental Society furnish ample material for original work.

3 *History of Sanskrit Literature.* 2 hrs.
This course is intended only for those who have had at least one year's instruction in Sanskrit.

4 *Introduction to Comparative Syntax.* 2 hrs.

Assistant Professor OERTEL:—

5 *Linguistics.* 2 hrs.
A discussion and exposition of the general principles and chief problems of linguistic science; such topics as sound-change, change of significance, the fundamental facts of syntax, the relation of grammar to logic, the relation of linguistics to ethnography, the theories of the origin of speech, etc., are examined. Paul's *Principles of the History of Language* (Macmillan) is used as a text-book for part of the course and critically read. As time permits, some of the more important questions regarding the Indo-European branch are discussed. The course

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consists largely of lectures, but it requires outside reading and occasionally the preparation of short papers on assigned topics. The course is intended as a general introduction to the Science of Language, and no knowledge of Sanskrit is necessary for it.

6 *Phonetics.* 1 hr.

An introduction to general Phonetics on the basis of Sievers' *Grundzüge der Phonetik*, 4th ed., Leipzig, 1893, and their application to the English, German, and Latin sound-systems. Sweet's *Primer of Phonetics*, Oxford, 1890; Laura Soames's *Introduction to Phonetics*, London, (Swan, Sonnenschein & Co.); Vietor's *Elemente der Phonetik und Orthoepie des Deutschen, Englischen u. Französischen*, 3d ed., Leipzig, 1894; O. Bremer's *Deutsche Phonetik*, Leipzig, 1893; and Seelmann's *Die Aussprache des Latein*, Heilbronn, 1885, are chiefly used, and private reading in these will be required. The course is intended to furnish a basis for the study of the phonology of the various languages.

7 *Comparative Phonology and Morphology of Greek and Latin.* 2 hrs.

A resumé of the chief results of the modern comparative treatment of Greek and Latin sounds and inflections. For the more important questions (such as *ablaut*, palatal law, etc.) a historical sketch of the course of investigation is given in order to illustrate method. Lindsay's *Latin Language*, 1894, Brugmann's *Griechische Grammatik* (in Iwan Müller's *Handbuch*, vol. I, part 1, 1890, second edition), V. Henry's *Short Comparative Grammar of Greek and Latin* (Macmillan) and Bechtel's *Hauptprobleme der indogermanischen Lautlehre* 1892, should be in the hands of the students and considerable private reading in them will be required. Some knowledge of Sanskrit is very desirable.

GREEK.

Professor PERRIN :—

8 *The Tradition of the History of Alexander.* 3 hrs.

Lectures and Seminary Exercises.

A critical study of the sources for the history of Alexander, from the *Letters* of Alexander himself, and the *Journals*, through the *Anabasis* of Arrian and the *Alexander* of Plutarch. The treatment of their authorities in the histories of Alexander by Thirlwall, Grote, Droysen, Holm, and Niese will be compared.

[Omitted in 1897–98.]

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9 *Pausanias.* 1 hr.

Lectures and Seminary Exercises.

A practical introduction to Pausanias, and a critical reading of his description of Olympia, with illustrations from the excavations of 1876–81. The complete Teubner text of Pausanias will be the only text-book required.

*10 *Aristophanes. The Testimony of Old Athenian Comedy to the Political and Social Life of its Time.* 2 hrs.

The *Acharnians*, *Knights*, *Wasps*, *Birds*, and *Plutus* will be read entire, together with extracts from other plays, and some of the more notable *Fragments*. The complete Teubner text of Aristophanes (ed. Bergk, 2 vols., which may be bound in one), will be desirable for those who take the whole course, and Merry's, Graves', and Nicolson's annotated editions of the plays read entire (Macmillan & Co., Ginn & Co.). The course may be dropped or entered at the winter (holiday) examinations.

[Tuesdays and Fridays, 9.30 A. M.]

*11 *Greek Social Life.* 1 hr.

In close, though not necessary, connection with the above course in Aristophanes, a weekly quiz, conference, or lecture will be held on the social life, customs, manners, and beliefs of the ancient Greeks, particularly of the Athenians. The Gardner-Jevons *Manual of Greek Antiquities* (New York, Scribners', 1895) will be used as outline and manual. Supplementary reading in the best authorities will be assigned, and reports on this reading, either oral or written, will be required. This course cannot be divided at the winter (holiday) examinations.

[Wednesdays, 9.30 A. M.]

Professor SEYMOUR :—

12 *Aeschylus.* 3 hrs.

The extant plays of Aeschylus are read. The instructor interprets the *Prometheus* and parts of other plays. The members of the class later interpret in turn.

[Mondays and Thursdays, 8.30 to 10 A. M.]

13 *Plato.* 3 hrs.

The *Republic* and the portions of the other dialogues which are most important for its elucidation.

[Wednesdays, 4 to 6 P. M., and Fridays, 5 P. M.]

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14 *Pindar.* 1 hr.

The odes of Pindar are studied with specially qualified students, with exercises in the critical treatment and interpretation of the text, as a Greek *Seminary* course. The class meets once in two weeks for a two-hours' session.

[Omitted in 1897–98.]

15 *Epic Poetry.* 2 hrs.

Introduction to the critical study of Homer. Lectures on the history of Homeric study, Epic poetry, the composition and transmission of the poems, life in the Homeric times in its various aspects; Homeric language and verse. Followed by a familiar but critical interpretation (and exercises in interpretation and criticism) of portions of the *Odyssey*, and of the later Greek epics.

[Omitted in 1897–98.]

16 *History and Encyclopedia of Greek Studies.*

1 hr. 1st half year.

Fifteen familiar lectures, with special attention to bibliography.

17 *The Greek Orators.* 3 hrs.

A study of Greek Oratory, beginning with the orations of Isaeus, and including some of the private orations of Demosthenes, with reference to Athenian life and law, as well as to the development of Attic eloquence.

[Omitted in 1897–98.]

*18 *Pindar and Aeschylus.* 2 hrs.

The *Persians* and *Seven against Thebes* of Aeschylus, with special attention to the historical element in the *Persians*, as well as to the dramatic structure of the two plays. The principal extant odes of Pindar will be read, and a sketch of Greek Lyric Poetry will be given.

[Mondays and Fridays, 3 P. M.]

*19 *Plato.* 2 hrs.

The *Gorgias* and several of the minor dialogues are read, chiefly with reference to the characteristics of Plato's literary style and the form of the dialogue, but without neglecting entirely the Platonic philosophy.

[Tuesdays and Thursdays, 3 P. M.]

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*20 *Greek Testament.* 1 hr.

A philological study of St. Paul's Epistles to the Corinthians, and the chief characteristics of the Hellenistic diction.

[Saturdays, 9.30 A. M.]

*21 *The Phaedo of Plato.* 2 hrs. 1st term.

Introduction to the literary and philosophical study of Plato.

[Omitted in 1897–98.]

*22 *Aristotle's Nicomachean Ethics.* 2 hrs. 2d term.

Books i–iv and x, with a study of Aristotle's methods of research and statement.

[Omitted in 1897–98.]

Professor GOODELL :—

23 *Sophocles.* 3 hrs.

Reading of the seven extant plays with special attention to the artistic form, including the poet's literary style, treatment of the myths, management of the action, use of metres, and the like. A brief but systematic introduction to Greek rhythmic and metric is given by lectures, combined with practice in reading; to this is devoted one hour weekly.

This course is intended for Graduates and for Juniors and Seniors who have done superior work in Greek.

[This course will be omitted in 1897–98.]

*24 *Greek Archæology.* 2 hrs.

An introduction to the study of Greek architecture, sculpture and pottery, with some attention to gems, coins, metal work, figurines, and painting, as illustrated by existing examples. Prominence is given to the historical development of Greek artistic production and its relation to other phases of Greek life and to modern art. A good reading knowledge of French or German is very useful, though not essential.

[Wednesdays and Fridays, 10.30 A. M.]

Professor REYNOLDS :—

25 *Aristotle's Poetics. Literary Criticism in Ancient Times.* 1 hr.

Interpretation of the *Poetics* and parts of the *Rhetoric*, with selections from Plutarch, Pseudo-Longinus, and Lucian.

[Mondays, 10.30 A. M.]

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26 *Late Greek Poetry.* 1 hr.

This course includes a survey of Alexandrian and later Greek poetry. Reading of the mimes of Herondas, with selections from the Anthology, and from the hymns of Callimachus, and other fugitive poetry.

*27 *Euripides.* 2 hrs.

A reading course with reference to Euripides' poetic and dramatic quality. Five or six plays will be read. Discussion of the poet's relation to his own times, style, metres, dramatic innovations, and influence on the Roman and the modern dramatists, with occasional lectures.

[Omitted in 1897–98.]

*28 *Lucian.* 2 hrs.

A general reading course in prose, with discussion of the life and times of Lucian and of his influence upon modern literature. The *Dream*, *Charon*, *Timon*, *Angler*, and *True History* will be read, with many minor pieces, including the *Dialogues of the Gods* and *Dialogues of the Dead.* The Teubner text-edition will be used together with Williams's *Selections from Lucian.*

[Tuesdays and Fridays, 12.30 P. M., 14 Phelps Hall.]

Professors REYNOLDS and OERTEL :—

*29 *Greek Inscriptions.* 3 hrs.

a. Attic Inscriptions, with reference to the history of the alphabet, grammatical peculiarities, formulae, and historical content. The student is familiarized with the reading of inscriptions in their original form (by means of paper squeezes).

b. Greek Dialect Inscriptions will be read chiefly from the grammatical side, together with the fragments of the lyric poets, with special reference to the help that may be derived from the inscriptions for the constitution of their text. The text-books are Cauer's *Delectus Inscriptionum Graecarum*, and Bergk's *Anthologia Lyrica.*

Mr. KITCHEL :—

30 *The Sicilian Invasion.* 2 hrs.

The Sixth and Seventh Books of Thucydides will be read. The relation of this great catastrophe to the preceding and the subsequent history of the Athenian empire will be emphasized; the geography and topography involved will be carefully considered, and the author will be compared with the historians who preceded and followed him.

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31 *The Choephori of Aeschylus, the Electra of Sophocles, and the Electra of Euripides.* 2 hrs.

These plays, together with the *Frogs* of Aristophanes, will be read and carefully compared, with the intent of noting the development of the drama thus exhibited. The points of similarity and dissimilarity between the ancient and the modern drama will be sought for.

[This course will be omitted in 1897–8.]

Dr. FAIRBANKS :—

32 *Hellenistic Greek.* 1 hr.

Readings from the Septuagint; characteristics of Hellenistic Greek; relation of the Septuagint to the Hebrew text of the Old Testament.

[Fridays, 10.30 A. M.]

33 *Greek Worship and Belief.* 2 hrs.

Readings from Pausanias. Lectures and conferences (*a*) on forms of Greek worship and (*b*) on the types of Greek gods in worship, in literature, and in art. The Gardner-Jevons *Manual of Greek Antiquities* will serve as a starting point for the work.

The object of the course is to give a general survey of the Greek gods, and an introduction to the study of Greek religious antiquities. The course is intended to throw light on the Greek authors commonly read, and in particular to meet the needs of those who expect to teach the Classics. At the end of the year a few lectures will be given on the course of the development of religion in Greece.

[Tuesdays and Fridays, 9.30 A. M.]

34 *Testimony of the Drama to Religion at Athens in the Fifth Century B. C.* 1½ hrs.

The plays of Aeschylus will be carefully studied to determine what light they throw on beliefs and rites of worship, and also on the religious feeling of writer and audience.

The work will be supplemented by lectures on forms of religious worship, the different cults and festivals of Athens, the conceptions of the gods, and the relation of religion to art, to philosophy, and to social and political life during the fifth century B. C.

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Mr. BROWNSON :—

35 *Greek Composition and Sight-Reading.* 2 hrs.

[Mondays and Fridays, 4 P. M., 17 Phelps Hall.]

Alternate exercises in composition and in the translation at sight of selections from Xenophon. The course is designed especially for those who intend to teach.

LATIN.

Professor PECK :—.

36 *The Satires of Horace and the Dialogus of Tacitus.* 2 hrs.

[Saturdays, 9.30 to 11.30 A. M.]

37 *Early Latin.* 2 hrs.

Study of inscriptions and of the ante-classical literature, based on Allen's *Remnants of Early Latin* and Merry's *Fragments of Roman Poetry.*

The course is largely philological and critical, dealing with the development of forms, constructions, and literature.

[Wednesdays, 9.30 to 11.30 A. M.]

*38 *Cicero* (*Brutus*), *Quintilian* (*X and XII*), *and Tacitus* (*Dialogus*). 2 hrs.

[Mondays and Thursdays, 10.30 A. M.]

*39 *Tacitus* (*Annals, I–VI*) *and Suetonius* (*Augustus and Tiberius*). 2 hrs.

[Mondays and Thursdays, 11.30 A. M.]

*40 *Lucretius: the Younger Pliny.* 2 hrs.

[To be given 1898–99.]

*41 *Latin Philology.* 1 hr.

[To be given 1898–99.]

*42 *Roman Archæology.* 1 hr.

[To be given 1898–99.]

*43 *Ennius, Lucretius, Vergil, and Horace.* 2 hrs.

[Omitted in 1897–98.]

*44 *The Letters of Cicero, Pliny, Fronto, and Marcus Aurelius.* 2 hrs.

[Omitted in 1897–98.]

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Professor H. P. WRIGHT.

*45 *Latin Lyric and Elegiac Poetry.* 2 hrs.

Books iii and iv of the *Odes* of Horace, Latin Hymns (50 pages), selections from Catullus, Tibullus, and Propertius, with special reference to literary qualities.

[Mondays and Thursdays, 9.30 A. M.]

*46 *Latin Satire and Comedy.* 2 hrs.

Juvenal and Martial—*Satires* vii, viii, x, xi, xii, of Juvenal, with selections from Martial, with special reference to a study of the private life of the Romans.

Plautus—Three or four plays, with study of literary history, form, and influence.

[Omitted in 1897–98.]

Professor MORRIS :—

47 *Plautus.* 2 hrs.

Criticism and interpretation of the *Mostellaria*—text, forms, syntax, metres.

48 *Plautus.* 1 hr.

Lectures introductory to the study of Plautus, with work upon idioms and phraseology.

[Omitted in 1897–98.]

49 *Historical Syntax.* 2 hrs. both terms.

Lectures on the history of work in Latin syntax during this century, and on the principles and methods of the historical investigation of the modes and tenses; discussion of text-books and of a few good specimens of work in this field; outline of the syntax of the modes and tenses from the historical point of view.

The lectures are accompanied and followed by a study of the *qui* clause, the material for which will be collected and examined by students who take the course.

[Omitted in 1897–98.]

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50 *Text Criticism.* 1 hr.

Lectures on palæography and on the general principles of text-criticism, with practice upon the text of Nepos. Those who desire to take the course should procure Halm's larger edition, published by Teubner.

*51 *Vergil.* 2 hrs.

An introduction to Vergil, intended to give students who may expect to teach Latin an acquaintance with the best editions and commentaries and with works on special topics, e. g., the Life of Vergil, the Aeneas legend, relation to Homer and the early Roman epic, mythology, Vergil in the Middle Ages. Parts of the text will be translated and compared with English translation in prose and verse, and there will be practice in reading the hexameter with reference to the teaching of scanning.

Members of the class should be provided with a complete text.

[Tuesdays and Fridays, 10.30 A. M.]

*52 *Cicero.* 2 hrs.

A course in the orations of Cicero similar to course 51 in Vergil will be given in 1898–99.

[Omitted in 1897–98.]

Professor LANG :—

53 *Low Latin.* 1 hr.

The aim of this course, which extends over two years, is to give an historical account of the popular speech of Rome and of the Roman provinces, and also an outline of its grammar and syntax, as it is disclosed to us by classical Latin, the testimony of the Latin grammarians, inscriptions, mediæval documents, and the consensus of the Romance languages.

The first year's course is taken up with lectures on the history and the grammar of Low Latin and, as far as time permits, the reading of a Low Latin text. For the present the following is used: J. F. Gamurrini, *S. Silviae Aquitanae Peregrinatio ad Loca Sancta.* Editio altera. Romae 1888.

[Mondays, 3.30 to 4.30 P. M.]

54 *Low Latin* (second year). 1 hr.

The second year's course is taken up with the interpretation of Low Latin texts by the student and the study of special subjects assigned by the instructor.

[Thursdays, 3.30 to 4.30 P. M.]

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Dr. J. J. ROBINSON.

*55 *Roman Law.* 2 hrs.

This course is intended to benefit those who desire an insight into Roman law as part of a liberal education as well as those who contemplate the study of law as a profession. The class is not required to do philological work in this course. The work consists of lectures, assigned readings, and recitations upon lectures and readings.

The text of the *Institutes* of Justinian will be translated, the instructor explaining particularly the technical expressions of lawyers' Latin and lecturing upon the titles which embrace the most important principles of Roman jurisprudence. The study of the *Institutes* will be prefaced by lectures upon the history of Roman legislation and supplemented by reference to selected titles of the *Digest* and the commentaries of Gaius.

The Teubner text of *Justiniani Institutiones*, edited by Huschke, is used in the class-room.

[Mondays and Thursdays, 12.30 P. M.]

Assistant Professor OERTEL :—

56 *The Italic Dialects.* 1 hr.

After a brief survey of the peoples and languages of ancient Italy, the Oscan and Umbrian inscriptions will be read and interpreted. Students intending to take this course should provide themselves with Zvetaieff's *Inscriptiones Italiae inferioris dialecticae in usum praecipue academicum* 1886 (Mosquae) and *Umbrica interpretatus est F. Buecheler* (Bonnae) 1883.

57 *The Italic Dialects* (second year). 1 hr. both terms.

A continuation of the foregoing, together with a systematic exposition of the Phonology and Morphology of the Italic dialects, including the Latin.

Dr. THOMPSON :—

*58 *Ovid: Tristia and Libri ex Ponto.* 2 hrs.

a. The autobiography of Ovid as contained in these letters, his relations with Augustus and with friends in Rome, his style, especially its reminiscences of Horace, will be the topics chiefly dwelt upon.

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b. Cato the Censor. The accounts of his life in Cicero, Nepos, and Plutarch, and selected passages from his own works, will be read. His life, as representing the anti-Greek spirit of the period between the second and third Punic wars, will be made the basis for a study of that period.

[Mondays and Fridays, 2 P. M.]

Dr. INGERSOLL :—

*59 *Latin Literature.* 2 hrs.

The development and history of the main departments of Latin Literature. Selections from the principal writers will be read, with informal lectures. The text-books to be used and the method of conducting the course will depend on the make-up of the class. The selections read will be so chosen as not to duplicate or interfere with work in other courses.

[Mondays and Thursdays, 12.30 P. M.]

*Dr. A. L. WHEELER :—

60 *Latin Composition.* 1 hr.

Written exercises, based largely on some classical prose writer, will be read and criticised in class. These will be supplemented by informal lectures on Latin style, idioms, order of words, etc.

[Tuesdays, 3 P. M.]

For a course in Greek Philosophy, see course I, 24.

Mr. Albert S. Wheeler's course on Roman Law, in the Law School, is open to classical students under certain limitations.

Graduate students of this University, with the approval of the classical instructors, are admitted to the free enjoyment of the privileges of the American School of Classical Studies at Athens.

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THE CLASSICAL CLUB.

The Phelps Memorial Building, which was ready for occupancy in the autumn of 1896, was assigned to the use of the Classical Department of the University. In addition to twelve ordinary class-rooms, two seminary rooms, and offices for instructors, it contains a large apartment for the library and reading-room of the Classical Club. This room is intended to become the headquarters of advanced students in classical philology, and to furnish to them the advantages of a good private library. It already contains over two thousand volumes, of texts, commentaries, works on antiquities, etc., as the germ of a departmental library. The books most needed for the immediate work in the classical courses for the present year are to be found there. The recent gift to the University Library of the important library of Ernst Curtius, the distinguished archaeologist and historian, not only added to the philological and archaeological wealth of the main library, but also has supplied 600 volumes (many of which are rare and expensive) for the immediate use of the Classical Club. The Club meets every Saturday and spends that evening in reading and discussing the work of some classic author, with reports and papers in the field of Greek and Latin Philology. During the year 1897–98 the works of Lucian and Vergil will be studied.

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V. MODERN LANGUAGES AND LITERATURES

THOMAS R. LOUNSBURY, LL.D.
HENRY A. BEERS, M.A.
HENRY R. LANG, Ph.D.
GUSTAVE F. GRUENER, Ph.D.
ROBERT L. TAYLOR, B.A.
WILBUR L. CROSS, Ph.D.
JULES LUQUIENS, Ph.D.
ALBERT S. COOK, Ph.D., L.H.D.
ARTHUR H. PALMER, M.A.
WARREN A. ADAMS, Ph.D.
ROBERT N. CORWIN, Ph.D.

ROMANCE LANGUAGES

Professor LUQUIENS :—

1 *Early French Literature and Historical Grammar.* 2 hrs.
The first term is devoted to a study of the linguistic facts connected with the origin and formation of French from Latin, the rest of the year to reading from the best literary productions of the XIth, XIIth, and XIIIth centuries.
[Tuesdays and Saturdays, 8.30 A. M.]

2 *Middle Age Literature in France.* 1 hr.
A continuation of course 1, including, besides a survey of the works not touched by the latter, a discussion of the French dialects, especially of the Norman and Anglo-Norman.

3 *French Literature of the XVIth Century.* 2 hrs.
A study of the literary Renaissance in France.
[Omitted in 1897–98.]

*4 *Systematic Readings in the French Literature of the XVIIth Century.* 2 hrs.
A study of the works and authors of the French classic period.
Omitted in 1897–98.

*5 *Systematic Readings in the French Literature of the XIXth Century.* 2 hrs.
Study of representative works beginning with V. Hugo and reaching as near the present day as time will allow.
[Mondays and Thursdays, 9.30 A. M.]

6 *French Literature of the XVIIIth Century.* 2 hrs.
The main part of the course is devoted to a study of the evolution of French thought as manifested in the works of Montesquieu, Voltaire, Diderot, and J. J. Rousseau.
[Mondays and Fridays, 8.30 A. M.]

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Professor LANG :—

7 *Provençal Language and Literature.* 2 hrs.

This course is strictly literary and philological, and is open only to those who have made a scientific study of the language and literature of France and of Italy. The course begins with lectures on the historical grammar of old Provençal, after which the origin and growth of Provençal lyric poetry and Provençal metre are studied in connection with the reading of selections from the works of the Troubadours. The text-book used is Appel's *Provenzalische Chrestomathie.*

[Mondays, 3 P. M., and Fridays, 11.45 A. M.]

8 *Provençal (*Second Year*).* 1 hr.

The second year's course is taken up with the interpretation of Provençal texts by the student and the study of special subjects assigned by the instructor. Appel's *Provenzalische Chrestomathie* will be used as text.

[Thursdays, 3 P. M.]

*9 *Spanish, Elementary Course.* 3 hrs.

This course is open to those who have had Sophomore French or who shall otherwise satisfy the instructor of their fitness to take it. Stress will be laid on the acquisition of a good pronunciation and on such a mastery of the grammar as shall lead to a ready and accurate reading knowledge, which is the leading aim of the instruction.

Knapp's *Spanish Grammar*, Alarcon's *El Final de Norma* and Perez Galdos' *Doña Perfecta* will be used as text books.

[Mondays, Wednesdays, and Thursdays, 9.30 A. M.]

*10 *Spanish Literature of XVIth and XVIIth Centuries.* 2 hrs.

This and the following are literary courses, open only to such students as have passed through course 9 or who shall satisfy the instructor of their fitness by passing a special examination, evidence of which, in writing, must accompany the choice of the course.

Spanish Fiction. Study of the Novel in the golden age of Spanish literature, based on the reading of selections from works of the sixteenth century, but especially on Cervantes' *Don Quixote* (edition of Garnier Hermanos, Paris, 1875).

[Tuesdays and Fridays, 9.30 A. M.]

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*11 *Italian, Elementary Course.* 3 hrs.

This course is open only to those who have had Sophomore French, or who shall otherwise satisfy the instructor of their fitness to take it. Stress will be laid on the acquisition of a good pronunciation and on such a mastery of the grammar as shall lead to a ready and accurate reading knowledge, which is the leading aim of the instruction.

Grandgent's *Italian Grammar*, Bowen's *Italian Reader* and *Novelle scelte dal Decamerone* di G. Boccaccio (ed. Forniciari), will be used as text books.

[Tuesdays, Wednesdays, and Fridays, 10.30 A. M.]

*12 *Dante's Divina Commedia.* 1 hr.

The edition of Fraticelli will be used as text and Scartazzini's *A Companion to Dante* (London, 1893) is recommended for reference.

[Mondays, 10.30 A. M.]

*13 *Petrarch.* 1 hr.

A study of Petrarch's *Rime* and of his influence as the leader of the humanistic movement. Portions of the *Rime* will be critically read and explained, and lectures given on Petrarch's study of classical antiquity as manifested in his Latin works. G. Mestica's edition of *Le Rime de F. Petrarca* (Florence, 1896) will be used.

[Omitted in 1897–98.]

Mr. TAYLOR:—

*14 *Short Masterpieces of French Literature.* 2 hrs.

Rapid reading of short pieces by foremost French writers from all epochs, beginning with the XIXth century and reaching back to Montaigne in the XVIth.

[Tuesdays and Fridays, 10.30 A. M.]

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GERMANIC LANGUAGES

Assistant Professor GRUENER :—

15 *Gothic, Old High German, and Old Saxon.* 3 hrs.

An introductory course, especially for those who intend to study historically German or English.

The first half-year is given to the study of Gothic and its phonological relations to both earlier Indo-Germanic and later Germanic languages. Braune's *Gotische Grammatik*, and Streitberg's *Gotisches Elementarbuch* or Wright's *Gothic Language Primer*, Heyne's *Ulfilas*, Streitberg's *Urgermanische Grammatik*, and Henry's *Comparative Grammar of English and German.*

The second half-year is given to the study of Old High German and Old Saxon. Braune's *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch;* Gallée's *Altsächsische Grammatik;* Behaghel's *Hêliand.*

Professor PALMER :—

16 *Old Norse (Icelandic).* 3 hrs.

Grammar, and reading in the Sagas and the Elder Edda.

[Omitted in 1897–98.]

*17 *Scientific German.* 2 hrs.

Rapid reading of extracts and monographs treating of subjects in natural science.

[Omitted in 1897–98.]

*18 *History of German Literature, 1624–1832.* 2 hrs.

The development of German literature will be studied from the time of Opitz to Goethe's death.

[Omitted in 1897–98.]

Assistant Professor GRUENER :—

19 *Middle High German.* 3 hrs.

Hartmann; *Der arme Heinrich* and *Iwein. Nibelungenlied.* Selected poems of Walther von der Vogelweide. Selections from Wolfram von Eschenbach's *Parzival.* Lectures and papers.

[Omitted in 1897–98.]

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20 *German Literature of the Reformation Period (1500–1624).* 3 hrs.

The development of German literature is studied from the beginning of the Reformation to the time of Opitz. Characteristic works of the important writers of the period are read chiefly for literary purposes, though also with reference to the political, social, and religious conditions of the times.

[Omitted in 1897–98.]

*21 *Schiller, Works and Life.* 2 hrs.

Rapid reading of plays, poems, and prose writings of Schiller, with study of his life.

[Tuesdays and Fridays, 9.30 A. M.]

*22 *Prose of Modern German Historians and Critics.* 2 hrs.

Rapid reading of selections from historical and political writings, and from literary criticism.

[Tuesdays and Thursdays, 5 P. M.]

Dr. W. A. ADAMS :—

*23 *Goethe, Works and Life.* 3 hrs.

After an outline-study of Goethe's life and development in connection with his lyric poems, his early prose writings, and his principal dramas, particular attention will be given to Faust I and II, Goethe's later prose works and important utterances in letters, journals, and conversations.

[Mondays, Thursdays, and Saturdays, 9.30 A. M.]

Dr. CORWIN :—

24 *Lessing.* 2 hrs. both terms.

This course aims to acquaint the student with the regeneration of German literature through Lessing in his two-fold capacity of literary critic and poet. After an outline study of Lessing's life, and the literary and political conditions of the times, his works are read and discussed. Particular attention is given to the development of literary criticism and of the drama.

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Professor LOUNSBURY :—

25 *The English Literature of the XIVth Century.*

[Omitted in 1897–98.]

26 *The Early Victorian Era: Tennyson and his Contemporaries.* 2 hrs.

[Omitted in 1897–98.]

Professor BEERS :—

27 *Mediæval Allegory.* 2 hrs.

A study of mediæval allegory, including the *Romaunt of the Rose* (Chaucerian translation), *Piers Plowman*, and the *Purgatorio* of Dante, with two or three morality plays and passages from Hawes's *Pastime of Pleasure*. Candidates for this course should have a fair reading knowledge of Italian.

Professor COOK :—

The strictly graduate courses offered below are given according to circumstances and the needs of the graduate students actually in attendance; but special attention is given to the supervision of individual research along these and similar lines.

28 *Encyclopaedia and Methodology of English.*

This course is designed to acquaint the student with the more important branches of scholarship relative to the English language and literature, with a few of the representative books in each, and with the scope and method of research in this department.

[Wednesdays, 4 P. M.]

29 *Theories of Poetry.*

A course in the theories of poetry in general, and in the principles of criticism applicable to its various departments, as the epic, dramatic, and lyric. Discussions and papers on the basis of standard works, such as Aristotle's *Poetics*, Sidney's *Defense of Poesy*, Addison's *Criticisms on Paradise Lost*, Boileau's *Art of Poetry*, Lessing's *Laokoon*, and others of similar character. Reading of masterpieces to illustrate and extend the principles derived from theoretic works.

[Wednesdays, 3 P. M.]

30 *Advanced Old and Middle English.*

A survey of the subject for those who are not yet prepared for minuter specialization.

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31 *Seminary in Literature.*

A critical study of some representative writer. In 1894–95, Ben Jonson was the author selected; in 1895–96, Browning; in 1896–97, Chaucer. The Jacobean Drama will probably be the subject in 1897–98.

[Alternate Mondays at 7 P. M.]

32 *Middle English Texts.*

A course in the interpretation of selected Middle English texts.

33 *Historical English Prosody.*

Schipper's *Englische Metrik* is adopted as the basis of study, but reference is made to the discrepant views of other authorities.

*34 *Old and Middle English.* 2 hrs.

An elementary course in the beginnings and earlier development of the English language and literature. The first term is devoted to Cook's *First Book in Old English*, and *Exercises in Old English*. In the second term this is followed by some study of the history of the language in outline, and by the reading of selections from Chaucer and other Middle English writers for linguistic purposes.

[Mondays and Thursdays, 10.30 A. M.]

DR. CROSS :—

35 *English Prose Fiction from De Foe to George Eliot.* 1 hr.

A course of study in literary development. Instruction by lecture and conference.

[Mondays, 10.30 A. M., Room 9, South Sheffield Hall.]

MR. ——— ——— :—

36 *Troilus and Criseyde, and the Troy Story in English.* 1 hr.

Chaucer's *Troilus and Criseyde*, and Shakespeare's drama upon the same theme, will be read. Reference will also be made to Caxton's *Recueil*, Lydgate's *Troy Book*, and other English versions of the story of Troy. The required reading will embrace only English texts, but lectures will be given to establish the connection between Homer and the English versions of the Troilus and Cressida story. Benoît's *Roman*, Boccaccio's *Filostrato*, and Guido's *Historia*, will be compared, in lectures, with Chaucer's and Shakespeare's versions of *Troilus and Cressida.*

[Thursdays, 9.30 A. M.]

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THE MODERN LANGUAGE CLUB, formed of instructors and students in the departments of English, Romance Languages, and German, holds its regular meetings on the second Saturday evening of each month for the reading and discussion of original papers, and for reports of progress in the field of these studies.

THE ENGLISH CLUB, to which are invited all persons, whether members of the University or not, who are interested in the study or teaching of the English language or literature, meets on alternate Monday evenings to listen to the presentation of some topic, and engage in the informal discussion of it. The club never remains in session over an hour, and thus opportunity is afforded for keeping other engagements the same evening.

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VI. NATURAL AND PHYSICAL SCIENCE

GEORGE J. BRUSH, LL.D.
ARTHUR W. WRIGHT, Ph.D.
ADDISON E. VERRILL, M.A.
WILLIAM G. MIXTER, M.A.
EDWARD S. DANA, Ph.D.
FRANK A. GOOCH, Ph.D.
SAMUEL L. PENFIELD, M.A.
CHARLES E. BEECHER, Ph.D.
WILLIAM J. COMSTOCK, Ph.B.
HENRY L. WHEELER, Ph.D.
LAFAYETTE B. MENDEL, Ph.D.
BERTRAM B. BOLTWOOD, Ph.B.
WILLIAM H. BREWER, Ph.D.
OTHNIEL C. MARSH, Ph.D., LL.D.
SIDNEY I. SMITH, M.A.
HENRY S. WILLIAMS, Ph.D.
CHARLES S. HASTINGS, Ph.D.
RUSSELL H. CHITTENDEN, Ph.D.
HORACE L. WELLS, M.A.
LOUIS V. PIRSSON, Ph.B.
ALEXANDER W. EVANS, M.D.
PHILIP E. BROWNING, Ph.D.
WESLEY R. COE, Ph.D.

MINERALOGY

Professor DANA :—

1 *Mineralogy and Crystallography.* 2 hrs.

Practical study of mineral species by means of blowpipe analysis and other methods; mathematical study of crystals by the methods of analytical and spherical trigonometry as also of their optical properties. Additional opportunity is given to those who desire it to gain facility in the determination of minerals.

This course can be most advantageously prosecuted by those who have some knowledge of chemistry.

[Saturdays, 9.30–11.30 A. M.]

Professor PENFIELD :—

2 *Mineralogy.* 3 hrs. 1st term.

Blowpipe analysis, including the use of the blowpipe and of simple chemical methods for identifying the different elements in minerals. Lectures and laboratory work.

3 *Determinative Mineralogy.* 3 hrs.

A continuation of the above course, in which the student makes a practical study of the common minerals, having at command a collection of minerals for determinative work, besides a large collection of labelled specimens, for comparison, and an unlabelled collection, for practice in identifying minerals at sight.

4 *Descriptive Mineralogy.* 2 hrs. 2d term.

A series of lectures on the classification, occurrence, and properties of the mineral species, illustrated by the Brush Collection.

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5 *Crystallography.* 2 hrs. 2d term.

Lectures, illustrated by crystals and models, supplemented by practical work in the measurement, calculation, and drawing of crystals. These are followed by a few lectures on the physical and optical properties of minerals.

6 *Original Investigation in Mineralogy and Crystallography.*

Opportunities are offered to those who are far enough advanced, for research work in mineralogy and crystallography. This includes the study of the chemical composition and deduction of the formulæ of minerals, together with their physical, optical, and crystallographic properties.

Material for investigation is available from the University and Brush Collections.

Assistant Professor PIRSSON :—

7 *Petrology.* Daily, 9 A. M. to 1 P. M.

(*a*) Study and determination of the rock-making minerals by optical and chemical methods. Includes the use of the petrological microscope.

(*b*) History, origin, and classification of rocks, commencing with igneous types and passing into the crystalline schists, during which metasomatic and dynamic changes, including effects of dynamo-metamorphism, are taken up. The work is carried on mostly in the laboratory, with access to collections both of rocks and thin sections.

(*c*) Original investigation. In sequence to (*a*) and (*b*) some special object or locality may be made the subject of investigation. The work requires laboratory methods of determination, both chemical and microscopical, with consultation of the literature and occasionally work in the field. A large amount of material is available in the petrologic collections of the Sheffield Scientific School.

Only those whose previous training in mineralogy and geology has been sufficient to enable them to pursue the subject advantageously will be admitted to this course.

8 *Elementary Petrology.* Winter half term.

A series of lectures of an elementary nature, and without the use of the microscope, on the history, origin, and classification of rocks with especial reference to their geologic relations and economic properties. Illustrated by collections.

[Wednesdays, 3 P. M.]

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GEOLOGY

Professor WILLIAMS :—

*9 *Geology.* 2 hrs.

A course of lectures on the general principles of the science of geology. Historical geology will be studied chiefly from a geological standpoint; the special study of the relation of organisms to geology will be considered in the following course.

[Mondays and Thursdays, 9.30 A. M.]

10 *Geological Biology.*

The study of fossils in the laboratory, and with field-work so far as practicable, (1) as means of determining and classifying geological formations, (2) as evidence of the relations of organisms to their environment and of their evolution in the past.

For this course some knowledge of zoology is desirable; and for those who wish to take the course, and are not sufficiently well prepared in this direction, preliminary work in the zoology of living forms is planned.

Instruction is given also by informal lectures and the assignment of courses of reading of geological literature bearing upon the problems under investigation.

The number of hours and the specific line of study will be arranged by the instructor upon consultation in each case.

11 *Philosophy of Life and Organism.* 2 hrs. 1st half year.

A discussion of the facts and phenomena underlying the modern theories of evolution; and of the various forms of theory proposed to explain them.

[See Course I. 9, by Prof. Duncan.]

Assistant Professor PIRSSON :—

*12 *Elementary Structural and Dynamical Geology.* 3 hrs. first half year

The exercises are partly recitations and partly lectures, and are illustrated by maps, diagrams, and specimens. Leconte's *Elements of Geology* is used as a text-book.

[Mondays, Wednesdays, and Fridays, 8 A. M.]

Professor BREWER :—

*13 *Physical Geography.* 3 hrs. first half year.

This course of lectures will include the elements of dynamical geology, meteorology, and of natural history, so far as is necessary for an understanding of the physical geography of the globe and the distribution of species.

[Tuesdays, Wednesdays, and Thursdays, 5 P. M.]

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For a course in Physical Geography in its relation to history, see Political and Social Science, course 29.

PALÆONTOLOGY

Professor MARSH :—

14 *Vertebrate Palæontology.* 2 hrs. 2d term.

Lectures and laboratory instruction. Open to advanced students who are familiar with Zoology and Geology. Courses of study will be arranged by the instructor upon consultation with students.

Assistant Professor BEECHER :—

15 *Invertebrate Palæontology.* Daily, 11 A. M., both terms.

(*a*) The study of extinct faunas by means of collections of fossils from typical localities.

(*b*) Systematic study of the structure, development, and affinities of one or more classes of fossil animals.

In the laboratory work, attention is given to modern methods of preparation and preservation of specimens. Open to those who have some previous knowledge of geology and zoology.

(*c*) Original investigation. Following *a* and *b*, an opportunity is given to take up some special subject for investigation and the discovery of facts new to science. The requisite material is available in the extensive collections of the Peabody Museum. The work necessitates the frequent consultation of memoirs and scientific reports, occasional field-work, the use of the microscope, the preparation of thin sections, and other methods employed in practical investigation.

[Courses *a* and *b*: Laboratory work, three days per week, 2–5 P. M. Course *c*: Laboratory work, three days per week, 2–4 P. M. Other hours and divisions of work may be arranged to suit the convenience of students.]

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PHYSICS

Professor A. W. WRIGHT :—

16 *Physics.* 2 hrs.

Chiefly practical work in the Sloane Physical Laboratory, with measurements, especially in heat, light, and electricity, each exercise occupying two hours. As introductory to the laboratory practice, the exercises during a portion of the first term consist of recitations or discussions upon the theory and methods of physical measurements, the use of instruments, and other special topics. Laboratory facilities are also freely accorded to students of the course at other times than those of the stated exercises.

17 *Physics (Advanced course).*

Practical work in the Sloane Physical Laboratory, with instruction in the principles and methods of physical investigation, the processes and instruments of measurement, and the methods of computing and reducing results of observations. Special attention is paid to practical measurements in optics, electricity, and magnetism. The student is expected to make original investigations an important part of his work, and has the free use of the laboratory facilities for carrying them on.

For those who have already pursued course 16 or its equivalent.

Professor HASTINGS :—

18 *Physics.* 3 hrs. lectures, 6 hrs. laboratory work.

Laboratory work, supplemented by lectures on the theory of observation with the method of least squares, and on the theory of electricity and electrical instruments. The use of the laboratory is at the command of the student at all times.

[Lectures on Wednesdays, Fridays, and Saturdays, 12 M.]

For courses in Mathematical Physics, see Pure and Applied Mathematics, courses 4, 5, 7, and 8.

THE PHYSICS JOURNAL CLUB, composed of graduate students in Physics, meets weekly for the review and discussion of the current literature in this department of study.

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CHEMISTRY

(COURSES IN THE SHEFFIELD CHEMICAL LABORATORY.)

The analytical laboratories of the Sheffield Scientific School are open to students in term time from 9 to 1 and from 2 to 5 o'clock, every week-day except Saturday. The greater part of the instruction is given in the laboratory to each student separately, but the various classes have, in addition, two or more lectures or recitations a week, in connection with the studies pursued in the laboratory.

Professor MIXTER :—

19 *Chemical Physics.*

Especially the methods employed in the determination of molecular masses and specific heat.

Professor WELLS :—

20 *Qualitative Analysis.* 1st term.

Embraces a study of the commonly-occurring elements in their qualitative relations, and includes a systematic course of analysis for the same. A good knowledge of elementary chemistry is a necessary preparation for this. If desired, the course is extended to include a study of many of the rare elements.

[Laboratory work : Monday to Friday, 9 A. M. to 1 P. M., and 2 to 5 P. M. Lectures and Recitations : Thursdays and Fridays, 5 P. M.,—occasionally at 12 M.]

21 *Quantitative Analysis.*

This is open only to those who have taken course 20 or its equivalent.

(*a*) *Gravimetric Analysis.* Second term. Embraces a series of exercises involving a considerable number of important methods.

(*b*) *Volumetric Analysis.* First term. This follows the gravimetric analysis. It includes the most important and typical methods.

(*c*) *Ultimate Organic Analysis.* First term.

22 *Advanced Quantitative Analysis.*

(*a*) *Metallurgical Chemistry.* The analysis of ores, fuels, fluxes, alloys, metals, and other furnace products.

(*b*) *Mineralogical Chemistry.* The analysis of minerals for scientific purposes.

Laboratory work, every week-day (except Saturday) 9 A. M. to 1 P. M., and 2 to 5 P. M.

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23 *Metallurgy and Assaying.* 2d half of 2d term.

A course of lectures on elementary metallurgy, followed by a short course of demonstrative lectures on gold and silver assaying, with the practical application of assaying to a few typical ores.

24 *Technical Gas-Analysis.* 2d half of 2d term.

A short practical course, including the principal methods.

25 *Investigations in Inorganic Chemistry.*

Opportunities are offered to those who have had sufficient preparation to make researches on analytical methods, in the preparation and investigation of chemical compounds, and other scientific problems.

Mr. COMSTOCK :—

26 *Elementary Organic Chemistry.*

During part of the year the course consists of laboratory work, three exercises weekly. The remainder of the time is devoted to recitations supplemented by lectures, two hours weekly.

27 *Organic Chemistry.* 2 hrs. 1st term.

A continuation of the above course. Recitations and lectures.

[Thursdays and Fridays, P. M.]

Dr. H. L. WHEELER :—

28 *Advanced Organic Chemistry.*

This offers an opportunity for more extended study and original investigation to those who have proper preparation.

29 *Organic Preparations.* 1st half of 2d term.

Laboratory-work, consisting of five exercises per week of about three hours each in the preparation of such compounds as will give familiarity with the most important synthetical methods.

Mr. BOLTWOOD :—

30 *Physico-Chemical Measurements.* 2d term.

The course is intended to give an opportunity to those who desire to become acquainted with the more important methods of Physical Chemistry. The work comprises laboratory-work supplemented by lectures in which the general theory will be discussed. Ostwald's *Physico-Chemical Measurements* will be followed.

[Lectures, Mondays, 5 P. M.]

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31 *Electro-Chemistry.* 2d term.

This course is given in connection with the above, but is intended for those who wish to make a special study of Electro-Chemistry. Le Blanc's *Principles of Electro-Chemistry* will be followed, and opportunities for special laboratory-work in this subject will be afforded.

[Lectures, Friday, 5 P. M.]

(COURSES IN THE KENT LABORATORY.)

The Kent Laboratory is open daily from 9 A. M. to 1 P. M., and from 2 P. M. to 5 P. M. to students taking strictly graduate courses. The hours for most of the undergraduate courses are given below.

Professor GOOCH and Dr. BROWNING :—

*32 *Experimental Inorganic Chemistry.* 3 Exercises—6 hrs.

Practical laboratory work, lectures, and written exercises. An introduction to elementary chemical theory, the use of symbols and equations, and the descriptive study of the elements and their compounds. While elementary and fundamental in character, this course is probably sufficient for the needs of those who desire merely a very general knowledge of the facts and methods of chemistry. It is a prerequisite to the other courses in Chemistry, and to the course in Biology.

[Tuesdays and Thursdays, 2 P. M., and Wednesdays, 3 P. M.]

Dr. BROWNING :—

*33 *Qualitative Chemical Analysis.* 3 Exercises—5 hrs.

Laboratory practice in the ordinary processes of qualitative analysis, with lectures. This course is of special importance to those who intend to study medicine, engineering, or the technical profession in general, or who desire to teach elementary science.

[Mondays and Thursdays, 9.30–11.20, Wednesdays, 10.30 A. M.]

Professor GOOCH :—

*34 *Elementary Organic Chemistry.* 2 Exercises—4 hrs.

An introduction to the study of the compounds of carbon. Laboratory work with lectures. This course is a desirable adjunct to courses 32 and 33 for those who purpose to become students of medicine or applied chemistry, or who have a special interest in chemistry.

[Tuesdays, 10.30 A. M. and Fridays, 9.30 A. M.–12.20 P. M.]

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*35 *Quantitative Analysis.* 2 Exercises—6 hrs.

Laboratory practice in the use of the simpler methods of gravimetric and volumetric quantitative analysis. The course is intended chiefly for those who wish to study exact methods of manipulation and treatment with a view to the application of analysis to scientific or practical ends.

[Tuesdays and Thursdays, 2-4.50.]

36 *Quantitative Chemical Analysis (second course).*

Practice in the more complex processes of gravimetric, volumetric, and electrolytic analysis.

[Daily; hours for consultation fixed by appointment.]

37 *Organic Synthesis.*

Laboratory practice in synthetical processes too long or too complicated to be included in the more elementary work of Course 32.

[Daily; hours for consultation fixed by appointment.]

38 *Chemical Theory.* 1 hr.

This course (given in alternate years) is devoted to the discussion of the general principles and modern theories of chemistry.

39 *Special Methods.*

Laboratory practice in special methods of analysis and research.

[Daily; hours for consultation fixed by appointment.]

40 *Original Work and Research in Inorganic Chemistry.*

(*a*) Special problems of *analysis*—either experimental criticism of known processes or constructive work looking toward the development of new methods.

(*b*) The critical examination of reactions.

[Daily; hours for consultation fixed by appointment.]

Dr. BROWNING:—

41 *The Rare Elements.* 1 hr. both terms.

A short course of lectures covering the discovery, occurrence, and principal reactions of the elements not included in the general course. The methods in use for the qualitative and quantitative determinations will be carefully studied, and a systematic arrangement developed so far as practicable. Those who wish to do so may take laboratory work in connection with these lectures.

[Thursdays at 12 M.]

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42 *Inorganic Preparations.*

A short course, mainly laboratory work, covering typical methods for the extraction and preparation of salts from minerals. The early part of the work will deal with the more commonly occurring minerals; the latter with minerals which contain the so-called rare elements.

THE CHEMICAL CLUB, composed of instructors, graduate students, and others interested in chemistry, holds fortnightly meetings for the presentation and discussion of papers and reviews of recent work.

BIOLOGY

Professor VERRILL :—

43 *Zoology.*

Laboratory practice, recitations, readings, and lectures. The laboratory work is varied according to circumstances, in order to accommodate, as far as possible, those students who wish to pursue special branches. A large part of the time is usually devoted to comparative anatomy, morphology, and systematic zoology. Ample collections in the Peabody Museum, representing all classes of animals, are available for instruction, while the proximity to the sea makes it easy to provide fresh or living examples of most classes of marine animals for study and dissection.

Professor S. I. SMITH and Dr. COE :—

*44 *Elementary Anatomy and Histology.* 4 hrs. 1st term.

*45 *Elementary Anatomy and General Biology.* 6 hrs. 2d term.

Four exercises a week, of a minimum of two hours each. Laboratory work and informal lectures. The time is devoted principally to dissections of the frog, and work with the microscope on the lower plants and animals and in vertebrate histology, with special reference to the rudiments of biology and the elements of the morphology of animal tissues. The student is required to make microscopical preparations, keep careful records of his work, and pass frequent examinations.

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46 *Comparative Anatomy and General Biology.*

Graduate students who have had sufficient elementary training are received in the Sheffield Biological Laboratory and are provided with special advanced courses of instruction adapted as far as possible to the particular wants of the individual student. Such courses may cover either or both terms and require at least three hours of laboratory work per day for two or more days each week. To such students the laboratory is open five days a week.

Professor CHITTENDEN and Dr. MENDEL :—

47 *Physiological Chemistry.*

Graduate students who have sufficient knowledge of analytical and organic chemistry and elementary physiology are received into the Sheffield Biological Laboratory at the beginning of the academic year, where they can pursue a course in physiological chemistry extending throughout the entire year. The course necessitates, at an average, four hours of laboratory work each day, and attendance at lectures and recitations three or four times each week. Opportunities are afforded also for the carrying on of original investigations, and to students qualified for such work the laboratory is open during the entire day.

Students who are desirous of studying any special subject in physiological chemistry and have but a limited amount of time are also received provided they are qualified by previous work to pursue the study advantageously.

[Tuesdays, Wednesdays, Thursdays, and Fridays, 9 A. M. to 1 P.M.]

48 *Experimental Physiology.* 2 hrs.

Laboratory work, with lectures and demonstrations in muscle and nerve physiology, circulation, blood pressure, etc., using the various graphic methods ordinarily employed in physiological work. Opportunity is also afforded for more advanced work in certain lines of experimental physiology.

49 *Experimental Toxicology.* 2d half 2d term.

A course of about twenty lectures, with demonstrations on the physiological action of the more important mineral and alkaloidal poisons. This course can be supplemented, if desired, by laboratory work on the chemical reactions of poisons, with a study of the methods of detecting and separating poisons.

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*50 *Physiology.* 1 hr.

Huxley's *Lessons in Elementary Physiology*, with occasional lectures and illustrative experiments.

*51 *Physiological Chemistry.* 4 hrs. 2d term.

Four exercises a week, of a minimum of two hours each, in the laboratory of physiological chemistry. The time is devoted mainly to a study of the chemistry of the connective, contractile, and nervous tissues, of the chemical processes of salivary, gastric, and pancreatic digestions, and, so far as the time allows, of other subjects connected with the physiology of nutrition and the chemistry of the excretions.

A short course of lectures by Professor Smith on Embryology, and a somewhat longer one by Professor Chittenden on Experimental Toxicology, are also open to students in the above course.

A laboratory fee is charged for this course. The student in addition must bear the expense of gas, flasks, etc., which should not exceed ten dollars.

Dr. EVANS:—

*52 *Botany.* 3 hrs. 2d half year.

An elementary course in the botany of flowering plants. Laboratory work and recitations. During the first eight weeks the various parts of a plant, such as seeds, stems, buds, etc., are examined and discussed, and this work is followed by a study of the ordinary native plants of the vicinity.

[Tuesdays and Thursdays, 2–4 P. M.; Wednesdays, 2 P. M.]

53 *General Morphology of Plants.* 2 hrs.

Laboratory work and informal lectures. Beginning with the simplest forms, the various groups of plants are taken up in suitable types, and their structure, development, and mode of life, are studied and compared.

The course is limited to those who can show a satisfactory knowledge of the botany of the flowering plants.

[Wednesdays and Fridays, 3 P. M., 18 S. H.]

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Dr. Coe :—

54 *Cytology and General Embryology.* 4 hrs. 1st term.

Laboratory work supplemented by lectures, on the animal cell in the principal phases of its activity, with special reference to maturation, fertilization, and cleavage of the ovum. The course requires two forenoons a week and will include the practical study of cell with resting nucleus, cell-division, spermary and spermatozoa, ovary and maturation of the ovum, fertilization, cleavage, and formation of primary layers of the embryo. Considerable attention is given to the technique of the subject.

In addition to the above, special courses may be arranged for the second term to meet the requirements of individual students, and such courses may include a study of the later stages of the development of the embryo.

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VII. MATHEMATICS

JOHN E. CLARK, M.A.
CHARLES B. RICHARDS, M.A.
A. JAY DUBOIS, Ph.D.
ANDREW W. PHILLIPS, Ph.D.
JAMES P. PIERPONT, Ph.D.
JACOB WESTLUND, B.A.
WILLIAM M. STRONG, M.A.
J. WILLARD GIBBS, Ph.D., LL.D.
EUGENE L. RICHARDS, M.A.
WILLIAM BEEBE, B.A.
SAMUEL E. BARNEY, C.E.
PERCY F. SMITH, Ph.D.
GEORGE P. STARKWEATHER, M.E.

PURE MATHEMATICS

Professor GIBBS :—

1*a* *Vector Analysis.* 2 hrs. 1st term.

Elementary course, in which the simpler problems of geometry, kinematics, and mechanics are treated by vector methods. The matter taught is not entirely unlike that usually given in courses in quaternions, but the method followed is in some respects nearer to Grassmann's than to Hamilton's.

[Mondays and Thursdays, 3 P. M.]

1*b* *Vector Analysis.* 2 hrs. 2d term.

Advanced course, including differentiation with respect to position in space, the theory of the potential and allied functions, and that of linear vector functions. This course is especially designed as an introduction to the study of mathematical physics, and is open only to those who have taken the preceding.

2 *Multiple Algebra.* 1 hr.

The object of this course is to give some idea of the methods and results of the principal non-arithmetical algebras, especially of the *Ausdehnungslehre* and the algebra of matrices. It is intended for such students as have already some familiarity with the algebra of vectors, derived from the preceding courses or from the study of quaternions.

3 *Electricity and Magnetism.* 1 hr.

In this course, which is based on Maxwell's theory, the student is taught the use of vector methods in this branch of physics.

4 *Thermodynamics and Properties of Matter.* 2 hrs.

This course is a development of the consequences of the two fundamental laws of thermodynamics, as affording a general

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theory of physical and chemical equilibrium, and as giving shape to the investigation of the sensible properties of matter. See also VII, 27.

In the year 1898–99, in addition to the courses 1*a* and 1*b* in vector analysis, the following may be expected:

5 *Miscellaneous Applications of Vector Analysis.* 1 hr.

These applications are to such subjects as the theory of curvature, surfaces of the second degree, the motion of a rigid body, the fundamental principles of hydrodynamics, and elliptic and parabolic motion.

[Omitted in 1897–98.]

6 *Electro-Magnetic Theory of Light.* 2 hrs.

This course commences with the general theory of harmonic motion and its representation by complex scalar and vector quantities. The laws of electrodynamics are then applied to the phenomena of the propagation of light in isotropic and aeolotropic media, and its reflection at a surface between two such media, including the case of an absorbent medium, and the dispersion of colors.

[Omitted in 1897–98.]

7 *Dynamics and Thermodynamics.* 1 hr.

This course commences with the demonstration of the most general form of the laws of motion as given by Lagrange and Hamilton, and then proceeds to the application of the theory of probabilities to molecular mechanics, so as to deduce the notions of temperature and entropy, and the second law of thermodynamics.

[Omitted in 1897–98.]

Professor PHILLIPS.

*8 *Calculus.* 2 hrs.

The elementary problems of differentiation and integration; with applications to the expansion of functions into series, problems of maxima and minima, curve tracing, the rectification of curves, the quadrature on plane surfaces and surfaces of revolution, and the cubature of volumes. Osborn's *Calculus* will be used as a text-book.

[Tuesdays and Fridays, 9.30 A. M.]

Assistant Professor PIERPONT:—

9 *Advanced Calculus.* 3 hrs.

This is a continuation of Calculus course number 8, and is thus open only to those who have taken that course or its

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equivalent. The usual topics of an advanced course will be treated, but the following may be specially mentioned: the development of a function into series, the differentiation and integration of infinite series, indeterminate forms; definite integrals, change of variables and differentiation of such integrals, double integrals and change of order of integration; line and surface integrals, and investigation of definite integrals, either when the interval of integration becomes infinite or the integrand becomes infinite or discontinuous. The last part of the course will be devoted to an introduction to the theory of such differential equations as present themselves in Mechanics and Mathematical Physics. Instruction will be given by lectures. Examples taken from actual problems in pure mathematics and physics will be assigned students to work out, and of the three exercises of each week, one will be spent in this work. The following works may serve as books of reference:

A. Harnack—*Differential and Integral Calculus.*
Stegemann, Kiepert—*Differential and Integral Rechnung.*
Picard—*Traité d' Analyse.*

10 *Theory of Functions.* 2 hrs.

This is the first part of a comprehensive theory of functions of real and complex variables which is extended over two years. This year the greater part of the time will be spent on functions of real variables. In order to fill a general want, in giving the course this year a number of subjects which more properly would be included in an advanced course on Calculus will be also given. Some of the topics will be: general definition of number after Dedekind and Kantor; limits, ensembles or multiplicities; notion of a function; continuity and discontinuity; functions with an infinite number of discontinuities; theory of differentials, differential coefficients of various orders, right and left-handed differential coefficients, condition for the existence of differential coefficients, continuous functions without differential coefficients; infinite series, differentiation and integration of infinite series; theory of Taylor's Series after Pringsheim, indeterminate forms, principle of condensation of singularities; Riemann's theory of definite integrals; first and second law of the mean, double integrals, line and surface integrals. Also applications of the theory to: the Eulerian integrals of first and second species, Dirichlet's integral, Fourier's double integral, Poisson's integral, theory of Fourier's series. Many of the subjects being novel and delicate, pains have been taken to bring together a large collection of examples from *actual* prob-

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lems in pure mathematics and physics, which will be used for study and illustration in the lectures, and furthermore, in order that the student may acquire a practical knowledge of these subjects and a dexterity in their manipulation, the problems will be given to them as material or work in the seminary.

11 *Linear Differential Equations.* 2 hrs.

Continuation of the course of the same name of the previous year. Some of the more advanced parts of the theory will be given as: the study of the cases when the Gaussian function $F(\alpha, \beta, \gamma : x)$ is an algebraic function of x; the theory of the Schwarzian function η and a detailed study of the conformal representation it affords. Continuation of the general theory of linear differential equation of order n; theory of irregular integrals. The latter part of the course will be devoted to an exposition of Lie's theory of continuous groups in reference to linear differential equations.

A course in partial differential equations is planned for the following year, in which Lie's theory of transformation groups will be of determining influence.

Assistant Professor P. F. SMITH :—

12 *Plane Analytical Geometry (Advanced).* 2 hrs.

This will be a study of some of the more important of the modern ideas in Plane Analytical Geometry. Commencing with the general theory of homogeneous co-ordinates, which will be treated in detail with numerous examples, the general theory of plane algebraic curves will later be treated. The singularities of these curves will be carefully explained, and the more important formulae relating thereto derived.

The second half of the course will be a careful study of the theory of rational transformations, with applications to the reduction of the singularities of algebraic curves. A detailed study of other parts of the subject of importance in the theory of algebraic functions will then be made.

13 *Higher Geometry.* 2 hrs.

The plan of this course is to introduce the more modern notions of solid analytical geometry to those who are already familiar with the elements. The general idea of co-ordinates, and the new geometries to which this generalization has led, e. g. line geometry the spherical geometries of Darboux and Lie, will be

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studied in detail. Then the subject of Lie's continuous groups of transformations will be investigated with great care, especial attention being paid to the geometrical side of the theory.

Messrs. STRONG and WESTLUND.

*14 *Analytical Geometry.* 3 hrs.

This course is intended as an introduction to modern ideas on the subject. Beginning with elementary motions in determinants, numerous applications to geometry will be discussed. Then the idea of coördinate will be generalized, leading to line coördinates and the principle of duality. The last mentioned fundamental notion will be held constantly in mind throughout the course. Next will be developed the elements of analytical projective geometry, in which pencils of lines, ranges of points, anharmonic ratios, and their treatment by homogeneous coördinates will be discussed. The latter will then be extended to two dimensional configurations, and the abridged notation will be introduced with numerous examples. Next the idea of invariant in connection with group of transformations will be introduced, with a careful discussion of the case for one and two variables; special care will be devoted to this part of the course. The remainder of the year will be devoted to analytical geometry of three dimensions.

Mr. STARKWEATHER :—

15 *Mechanics.* 2 hrs.

The course will consist of lectures and recitations, following the general lines of standard works, such as Routh, Williamson, and Minchin.

APPLIED MATHEMATICS.

Professor CLARK :—

16 *Determinants and Differential Equations (successively).* 2 hrs.

The short courses in the above subjects are designed especially for the graduate students in the departments of engineering in the Sheffield Scientific School, whose time is mainly occupied with work in those departments.

[Wednesdays and Saturdays, 10 A. M.]

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Professor C. B. RICHARDS :—

MECHANICAL ENGINEERING.

This course, arranged for candidates for the degree of Mechanical (or Dynamical) Engineer, is open also to special graduate students, who are allowed in certain cases to take selected parts. The leading topics are :

17 *Applied Mechanics.*

Including graphical methods in applied kinematics, and in the investigation of mechanisms working with friction ; graphical determinations of the accelerations of the moving parts of machines ; the strength of materials as affecting the proportions of machine elements ; the applications of the principles of hydraulics to the construction and working of turbines and pumps.

18 *Thermodynamics.*

Applications to the compound steam-engine, air compressors and compressed air motors, engines worked by volatile vapors, refrigerating machines, the warming and ventilation of buildings.

19 *Machine-Design.*

In this course the student is engaged in practical exercises under the guidance of the professor in charge, investigating machinery, the designing and making of working-drawings, specifications, and estimates for machines and manufacturing plant. In addition to the study of machines in general, either of the following subjects (at the option of the student) receives particular attention : (*a*) Marine engineering ; (*b*) Railway machinery ; (*c*) Pumping machinery and plant ; (*d*) Machinery and plant for manufacturing. The student is required to make complete drawings, from new designs, of at least one important piece of machinery under one of these subjects. A compound marine engine and boilers, a locomotive, a turbine driving centrifugal pumps, a blowing-engine for an iron furnace, are examples.

Candidates for the degree of Mechanical Engineer are required to take also a course in mathematics, to sustain a final examination, and to present a satisfactory thesis on a subject approved by the professor in charge of the course.

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Professor DuBois :—

Civil Engineering.

This course offers instruction for advanced graduate students as well as for those students who may be regular candidates for the degree of Civil Engineer. It embraces the following topics:

20 *Mechanics applied to Engineering.*

Including the application of kinematics, statics, and kinetics to engineering problems.

[No definite hours.]

21 *Construction and Design.*

Including the strength and properties of materials, construction and design of bridges, roofs, foundations, retaining walls, dams and embankments, masonry arches, sewerage and drainage, improvement of rivers and harbors, specifications and contracts, and the preparation of designs and working-drawings.

Candidates for the degree of Civil Engineer are required to take, in addition, a selected course in mathematics, practical astronomy, and when the facilities in the physical laboratory permit, a course of laboratory work, under the superintendence of the professors in charge. They are also required to sustain a final examination, and to present a satisfactory thesis, accompanied by appropriate designs, upon a subject approved by the professor in charge of the course.

To special students, not candidates for the degree of Civil Engineer, a selection of special topics is allowed.

[No definite hours.]

Assistant Professor Barney :—

22 *Geodesy and Practical Astronomy.* 2d term.

Methods of observation, based on measurements, triangulation field-work ; theory of least squares, adjustment of observations, and computation of geodetic latitudes, longitudes, and azimuth. The study of practical astronomy embraces the use of the sextant and engineer's transit with solar attachment for determining time, latitude, azimuth, and needle variation.

23 *Railway Surveying.* Three weeks in September.

Design and Construction of Sewers and Sewage Disposal. 1st term.

Design of system for some town, including all estimates, maps, and detail drawings necessary for the construction of the system and disposal of the resulting sewage.

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Assistant Professor BEEBE :—

*24 *Descriptive Astronomy.* 3 hrs. 1st half year.

Intended principally for the study of topics connected with the historical and physical side of astronomy. Only so much mathematical work is introduced as is essential to an understanding of such topics. Text-book : Young's *Elements of Astronomy.*

Opportunity will be given for study of constellations and observation with the telescope.

[Mondays, Wednesdays, Thursdays, 10.30, A. O.]

*25 *Surveying.* 3 hrs. 2d half year.

One, or sometimes two hours a week are given to recitations. The other exercises are in field- or office-work during the afternoons, each exercise occupying not less than two hours.

Field-Work : The ordinary operations of land-surveying, leveling, and elementary topography, involving the use of the chain, compass, surveyor's level, transit, and plane table.

Office-Work : Plotting surveys from the field notes ; determination of areas from the map and by numerical calculation ; map-drawing, plane and topographical ; examination of instrumental errors.

Text-book : Johnson's *Surveying.*

[Mondays, 10.30 A.M., Wednesdays and Fridays, 2–3.50 P. M., A. O.]

*26 *Practical Astronomy.* 2 hrs.

This course is open only to those who have taken course 24. It consists of observatory work with astronomical transit and chronograph for determination of sidereal and standard time, and with sextant and theodolite for determination of latitude and azimuth, numerical computations for reduction of observations, derivation of formulae, and recitations from Loomis's *Practical Astronomy.*

This course will be omitted in 1897–98.

27 *Computation of Orbits.* 2 hrs.

Development of formulae and numerical calculations for determining the parabolic orbit of a comet from three observations.

Computation of an ephemeris and reduction of observations for comparison with the ephemeris.

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To those who are familiar with vector methods, an opportunity will be given during the latter part of the year to compute an orbit by vector methods with Professor Gibbs.

The course may be carried on through a second year to computation of elliptic orbits and the discussion of perturbations.

[Fridays and Saturdays, 10 A. M.]

THE ENGINEERS' CLUB meets monthly in North Sheffield Hall for the reading and discussion of papers on subjects relating to the different branches of engineering.

Lectures are occasionally given before the club by professional experts.

THE MATHEMATICAL CLUB holds fortnightly meetings, at which are presented sketches of the history of mathematical development and inventions, summaries of articles in the current periodicals and other publications in pure and applied mathematics, descriptions and models of new apparatus, together with the original investigations of the instructors and advanced students in this department of study.

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VIII. THE FINE ARTS

JOHN F. WEIR, N.A., M.A JAMES M. HOPPIN, D.D.
JOHN H. NIEMEYER, M.A.

Professor WEIR :—

1 *Technical Course in Painting.* 2 hrs.

This course consists of two exercises a week of two hours each. The course consists principally of studies in water-color painting, and includes lectures on the grammar of art, on painting, sculpture, and architecture, technically considered, with a critical account of the various schools and their representative masters. The lectures are fully illustrated by the use of the hydro-oxygen lantern. .

[Mondays and Fridays, 2 to 4 P. M.]

2 *Course in Modeling.* 2 hrs.

Two exercises a week of two hours each. The course consists in modeling from the antique and from the living figure, and is supplemented by the lectures given in course 1.

Professor HOPPIN :—

3 *History of Art.* 1 hr. 2d term.

The lectures in this department for the year 1898 treat of early Italian Painting ; these are followed by lectures on Modern Schools of Painting specially illustrated by such masters as Velasquez, Gerome, and Burne-Jones.

[Tuesdays, 4 P. M.]

Professor NIEMEYER :—

4 *Course in Drawing.* 2 hrs.

This course consists of two exercises a week of two hours each in drawing from the antique and from life, and also in sketching from nature out of doors. Exercises in original composition are required from time to time. It is the aim of this course to teach the fundamental principles of art, and to make the student familiar with the use of pen and pencil.

The work in drawing is supplemented by lectures in Linear Perspective and the analysis of the muscular movements of the human body as expressed in the external forms.

[Tuesdays and Thursdays, 2 to 4 P. M.]

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IX. MUSIC

HORATIO W. PARKER, M.A. SAMUEL S. SANFORD, M.A.

Professor PARKER :—

*1 *Harmony.* 2 hrs.

The study of chords, their construction, relations, and progressions.

This course covers the following subjects:

Intervals,—the measurement of distance from one tone to another; Triads of the major and minor scales, and their inversions; Seventh chords, primary and secondary, with their inversions and resolutions; Modulations; Chromatically altered notes; Suspensions; Organ point; Passing and changing notes; Harmonization of a given melody; Harmony in two, three, and five parts; Simple instrumental accompaniments.

The work is principally the writing of exercises from figured basses. The exercises will be corrected in the class-room with explanations and illustrations.

Jadassohn's *Harmony* (Breitkopf & Härtel, New York and Leipsic) is used as text-book.

[Tuesdays and Thursdays, 4 P. M., 3 Tr.]

*2 *Counterpoint.* 2 hrs.

The work is the harmonizing and supplying melodious additional voices to choral and other melodies used as *Canti Firmi.*

The different orders of Counterpoint in two, three, and four voices; also double counterpoint, and more or less free imitative writing.

Students in this course are encouraged to try the simpler forms of free composition. No text-book is used.

[Tuesdays and Thursdays, 3 P. M., 3 Tr.]

*3 *Strict Composition.* 2 hrs.

The more severe kinds of composition form the basis of work in this course.

Harmony in Five and more parts; Triple and Quadruple Counterpoint; Four- and three-part Fugues for voices or for instruments; Canons of various kinds, with or without accompaniment of free voices; Free treatment of different kinds of thematic material.

This course is preparatory to course 5.

No text-book is used.

[Tuesdays and Thursdays, 2 P. M., 3 Tr.]

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*4 *Instrumentation.* 2 hrs.

Lectures are given on the nature, compass, tone-color, and other characteristics of all the instruments of the modern orchestra, with written illustrations of their use by great composers.

Exercises in the practical orchestration of short pieces from the works of classic and modern composers, in the analysis of scores, etc., etc.

[Wednesdays and Fridays, 3 P. M., 3 Tr.]

5 *Free Composition.* 2 hrs.

Several of the smaller forms of free instrumental and vocal music are composed by the students, such as part-songs for male, female, or mixed voices, and pieces of different sorts for the piano and other instruments.

At the close of the year the student is required to produce an extended work, probably in sonata form.

[Wednesdays and Fridays, 2 P. M.]

Professor SANFORD :—

6 *Practical Music.*

Each student of the piano-forte receives individual instruction, under the supervision of Professor Sanford, who will in person instruct a limited number of advanced students in the higher branches of the art, particularly in *ensemble* and concert-playing. (No student is admitted to a course in practical music who has not been admitted to one of the theoretical courses.)

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X. PHYSICAL EDUCATION

JAY W. SEAVER, M.A., M.D. WILLIAM G. ANDERSON, M.D.

Dr. SEAVER and Dr. ANDERSON :—

* *Physiology and Gymnastics.* 2 hrs.

This course is designed for those who intend to teach gymnastics or to direct departments of physical education in institutions of learning. The work comes under two general branches as follows :

a. Physiology. This work consists of one recitation or lecture a week with Dr. Seaver, during the year. The first term is devoted to elementary physiology. The second term is devoted to human physiology ; special attention being given to a study of the circulation, respiration, digestion, and excretion. The hygienic importance of these topics is carefully studied. The third term is given to a study of sanitary science.

Collateral reading will be required during the third term.

[Thursdays, 7.00 P. M., University Gymnasium.]

b. Theory of Gymnastics. Under this head will be discussed by Dr. Anderson (*a*) the scientific basis of physical training ; (*b*) history of gymnastics and growth of the various systems ; (*c*) means employed, such as apparatus and appliances ; (*d*) physical examinations and measurements ; (*e*) pedagogy of gymnastics. Required text-books, Anderson's *Heavy Gymnastics* and *Methods of Teaching Gymnastics.*

Members of the class will be called upon to arrange exercises for other classes, to classify movements for overcoming common physical defects, and to do practice work in teaching gymnastics.

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LIST OF STUDENTS

IN ATTENDANCE DURING THE

ACADEMIC YEAR 1896–97

Dudley Chase Abbott, B.A. Wesleyan Univ. 1889	*West Haven, Conn.*	West Haven
Mary Winchester Abbott, B.A. Vassar College 1894	*West Haven, Conn.*	West Haven
Frederick Carhart Adams, B.A. Williams College 1895	*Natick, Mass.*	91 Bristol st.
Francis Mulliken Adams, PH.B. Yale University 1892	*New Haven, Conn.*	146 Edwards st.
John Chester Adams, B.A. Yale University 1896	*Brookline, Mass.*	597 P.
William Roderick Adams, LL.B. Yale University 1894, D.C.L. Yale University 1896	*Bloomfield, Conn.*	22 College st.
Alice Hopkins Albro, B.A. Bryn Mawr College 1890	*Mansfield, Penn.*	83 Grove st.
James Albert Allen, M.A. Kentucky University 1895	*Chenault, Ky.*	250 York st.
Mary Adèle Allen, B.A. Smith College 1896	*Holyoke, Mass.*	83 Grove st.
Walter Hinds Allen, B.A. Yale University 1895	*New Haven, Conn.*	58 W. D.
Gustav Albert Andreen, B.A. Augustana College 1881 and Yale University 1894	*New Haven, Conn.*	35 Whalley av.
Philip Andrew Andreen, M.A. Bethany College 1896	*Meriden, Conn.*	35 Whalley av.
Martha Austin, B.S. Smith College 1892	*Easthampton, Mass.*	83 Grove st.
William Bacon Bailey, PH.D. Yale University 1896	*Springfield, Mass.*	22 Lynwood st.
Thomas Nelson Baker, B.A. Boston University 1893, B.D. Yale University 1896	*Malden, Mass.*	20 E. D.
Edward Chauncey Baldwin, B.A. Yale University 1895	*W. Cornwall, Conn.*	82 Whalley av.
Edwin George Baldwin, B.A. Illinois College 1894	*Mendon, Ill.*	54 Garden st.

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Cecil Kittredge Bancroft, B.A. Yale University 1891	*Andover, Mass.*	102 N.
Amy Louise Barbour, B.A. Smith College 1891	*Hartford, Conn.*	70 Whalley av.
George Weed Barhydt, M.A. Union University 1896	*Westport, Conn.*	Westport
Bayard Barnes, PH.B. Yale University 1895	*New Haven, Conn.*	1442 Chapel st.
John Milton Berdan, B.A. Yale University 1896	*New York City*	523 P.
Anna Hunt Billings, B.L. Smith College 1891	*Redlands, Cal.*	70 Whalley av.
Leslie Dayton Bissell, PH.D. Yale University 1896	*New Haven, Conn.*	1010 Chapel st.
Henry Davenport Blackwell, B.A. Randolph-Macon College 1890	*Broad Run, Va.*	541 Howard av.
Bertram Borden Boltwood, PH.B. Yale University 1892	*Castleton, N. Y.*	162 S. L.
Arthur Eli Booth, C.E. Yale University 1893	*Peace Dale, R. I.*	52 Howe st.
George A. Booth, PH.B. Univ. of Omaha 1896	*New Haven, Conn.*	450 Elm st.
Joseph Bowden, Jr., B.A. Yale University 1891	*New Haven, Conn.*	90 Lake pl.
Zakar Elijah Boyajian, B.A. Euphrates College 1895	*Harpoot, Turkey*	249 Crown st.
James Wallace Broatch, B.A. Yale University 1891	*Omaha, Nebr.*	596 P.
Carleton Lewis Brownson, B.A. Yale University 1887	*New Haven, Conn.*	79 Edwards st.
Henry Andrews Bumstead, B.A. Johns Hopkins University 1891	*New Haven, Conn.*	203 Lawrence st.
George Lincoln Bunnell, PH.B. Yale University 1896	*Bridgeport, Conn.*	558 Chapel st.
Otis Gridley Bunnell, PH.B. Yale University 1892	*Burlington, Conn.*	96 York sq.
Forest Emberson Calland, B.A. Drury College 1893	*Springfield, Mo.*	200 Grove st.
Alexander Cameron, B.A. Carleton College 1896	*Duluth, Minn.*	119 W. D.
Henry Lewin Cannon, B.A. W. Reserve Univ. 1893 and Harvard University 1894	*New Haven, Conn.*	473 Winthrop av.
William Woods Chandler, B.A. Yale University 1896	*New Haven, Conn.*	31 High st.
Harvey Wood Chapman, B.A. Yale University 1896	*Bridgeport, Conn.*	Bridgeport
George Harry Clark, PH.B. Yale University 1896	*New Haven, Conn.*	125 Spring st.

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Clement George Clarke, B. A. Yale University 1895	*Manhattan, Kan.*	219 York st.
Edward Day Collins, B.A. Yale University 1896	*Barton Landing, Vt.*	61 Garden st.
William Eugene Conklin, B.A. Trinity College 1893	*Hartford, Conn.*	9 Vernon st.
Hollie May Conrey, B.S. Natl. Normal Univ. 1893, B.A. Natl. Normal Univ. 1894	*Lebanon, O.*	276 Orange st.
Alberta Linton Corbin, B.A. Univ. of Kansas 1893	*Lawrence, Kansas*	78 Dwight st.
William Lee Corbin, B.A. Amherst College 1896	*Homer, N. J.*	85 W. D.
Harlan Creelman, B.D. Yale University 1889, PH.D. Yale University 1894	*New Haven, Conn.*	183 Lawrence st.
Daniel Floyd Culler, B.A. Pennsylvania College 1893	*Apollo, Pa.*	563 Howard av.
Johannes Heinrich Cuntz, C.E. Renss. Polytechnic Inst. 1886, M.E. Stevens Inst. 1887	*Hoboken, N. J.*	90 High st.
Anna Alice Cutler, M.A. Smith College 1889, PH.D. Yale University 1896	*New Haven, Conn.*	284 Orange st.
Eleanor Evelyn Cutler, B.A. Smith College 1892	*New Haven, Conn.*	284 Orange st.
William Watts Davidson, B.A. Yadkin College 1880, B.D. Yale University 1888	*Gibsonville, N. C.*	343 George st.
Arthur Ernest Davies, B.D. Yale University 1891	*London, England*	105 Humphrey st.
Henry Davies, B.D. Yale University 1888	*New Haven, Conn.*	32 Asylum st.
Arthur Louis Day, PH.D. Yale University 1894	*New Haven, Conn.*	25 High st.
Roger Sherman Day, Jr., B.A. Pomona College 1894	*Los Angeles, Cal.*	61 W. D.
Lee Maltby Dean, B.A. Yale University 1896	*Bridgeport, Conn.*	Bridgeport
Lee DeForest, PH.B. Yale University 1896	*Talladega, Ala.*	387 Temple st.
Elizabeth Street Dickerman, B.A. Smith College 1894, PH.D. Yale University 1896	*New Haven, Conn.*	15 Lake pl.
Sherwood Owen Dickerman, B.A. Yale University 1896	*New Haven, Conn.*	582 P.
Schmucker Duncan, B.A. Pennsylvania College 1891, M.A. Yale University 1894	*Gettysburg, Pa.*	91 W. D.

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John Cyrus Duncanson, B.A. Colgate University 1879	*Wakefield, R. I.*	701 Chapel st.
John Joseph Dunn, B.A. Yale University 1895	*New Haven, Conn.*	921 Grand av.
Harry Westbrook Dunning, B.A. Yale University 1894	*Boston, Mass.*	322 Orchard st.
Edward Lewis Durfee, B.A. Yale University 1896	*Palmyra, N. Y.*	19 Lynwood st.
George Francis Eaton, B.A. Yale University 1894	*New Haven, Conn.*	70 Sachem st.
John Warren Edgerton, B.A. Trinity College 1894, M.A. Yale University 1896	*Middletown, Conn.*	Middletown
Jay Glover Eldridge, B.A. Yale University 1896	*Penfield, N. Y.*	348 Orange st.
Lucy Elson, B.A. Vassar College 1885	*New Haven, Conn.*	79 Pearl st.
S. Laura Ensign, B.A. State Univ. of Iowa 1876	*New Hartford, Iowa*	16 York sq.
Evore Evans, B.D. Yale University 1895	*Ellsworth, Conn.*	73 Howe st.
Charles Kingsley Fankhauser, B.A. Marietta College 1893, B.D. Yale University 1896	*Avon, Conn.*	121 Dwight st.
Hollon Augustus Farr, B.A. Yale University 1896	*Athol, Mass.*	Jena, Germany
William Henry Ferris, B.A. Yale University 1895	*New Haven, Conn.*	87 Eaton st.
Harry Ward Foote, PH.B. Yale University 1895	*New Haven, Conn.*	162 S. L.
John Marshall Gaines, B.A. Yale University 1896	*New Haven, Conn.*	529 P.
Henri Comstock Garneau, B.A. St. Louis University 1893, PH.B. Yale University 1895	*St. Louis, Mo.*	46 College st.
William John Gies, M.S. Pennsylvania College 1896, PH.B. Yale University 1894	*Manheim, Pa.*	2 Hillhouse av.
George Wilbur Fiske Gillette, PH.B. Yale University 1896	*New Haven, Conn.*	9 Eld st.
William Anthony Granville, PH.B. Yale University 1893	*New Haven, Conn.*	487 Orange st.
Gervase Green, B.A. Yale University 1894	*New Haven, Conn.*	136 Sherman av.
Herbert Ernest Gregory, B.S. Gates College 1890, B.A. Gates 1895 and Yale Univ. 1896	*Neligh, Nebr.*	74 Lake pl.
Matthew Griswold, Jr., PH.B. Yale University 1888	*Erie, Pa.*	A.

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Grace Guthrie, B.A. Bucknell Univ. 1894	*Pottsville, Pa.*	1157 Chapel st.
William Henry Hackett, B.A. Yale University 1893	*New Haven, Conn.*	143 West st.
Armenag Harutune Haigazian, B.A. Central Turkey College 1889, S.T.B. Hartford Theological Seminary 1896	*Hadjin, Asia Minor*	28 E. D.
Josiah Harmar, PH.B. Yale University 1892	*Philadelphia, Pa.*	A.
Ella Isabel Harris, M.A. Waynesburg College 1892	*Westfield, N. J.*	45 Lake pl.
Carl Axel Harström, M.A. Hobart College 1889	*Norwalk, Conn.*	Norwalk
Franke Stuart Havens, B.A. Yale University 1896	*Hartford, Conn.*	427 Temple st.
Herbert Edwin Hawkes, B.A. Yale University 1896	*New Haven, Conn.*	61 Garden st.
Charlotte Williams Hazlewood, B.A. Wellesley College 1891	*Lynn, Mass.*	132 College st.
Theodore Woolsey Heermance, B.A. Yale University 1893	*New Haven, Conn.*	83 Wall st.
Yandell Henderson, B.A. Yale University 1895	*Louisville, Ky.*	81 Wall st.
Burton Jesse Hendrick, B.A. Yale University 1895	*New Haven, Conn.*	92 Clark st.
William Milton Hess, B.A. Yale University 1896	*Philadelphia, Pa.*	67 W. D.
Richard Thayer Holbrook, B.A. Yale University 1893	*New York City*	90 S. M.
Frank Thomas Hooker, B.A. Yale University 1896	*Ontario Centre, N. Y.*	41 High st.
Lemuel Robert Hopton, PH.B. Yale University 1896	*New Haven, Conn.*	13 Lake pl.
Richard Henry Hughes, B.D. Yale University 1893	*Herkimer, N. Y.*	52 E. D.
John Louis Hunt, B.A. Yale University 1895	*Jerseyville, Ill.*	232 York st.
Everett Bradley Hurlburt, PH.B. Yale University 1894	*Roxbury, Conn.*	145 College st.
Lola Launnot Iddings, B.A. Vassar College 1889	*Orange, N. J.*	Orange, N. J.
Charles Anthony Ingersoll, PH.B. Yale University 1893	*New Haven, Conn.*	24 Elm st.
James W. D. Ingersoll, PH.D. Yale University 1894	*New Haven, Conn.*	399 B.
Holmes Condict Jackson, PH.B. Yale University 1896	*Newark, N. J.*	36 Elm st.
Frank Mason Jeffrey, B.A. Yale University 1896	*Torrington, Conn.*	204 Grove st.

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Harry Benjamin Jepson, B.A. Yale University 1893, MUS.B. Yale University 1894	*New Haven, Conn.*	52 Howe st.
Mabel Preston Jepson, B.L. Smith College 1893	*New Haven, Conn.*	52 Howe st.
William Smythe Johnson, B.P. Ouachita Bapt. College 1890, M.A. Ouachita Bapt. College 1895	*Arkadelphia, Ark.*	200 Grove st.
Edward Clinton Jones, B.A. Yale University 1895	*New Haven, Conn.*	84 William st.
Louis Cleveland Jones, B.A. Yale University 1896	*E. Durham, N. Y.*	427 Temple st.
Alfred Sewell Kedzie, PH.B. Adrian College 1891, B.A. Adrian College 1893	*New Haven, Conn.*	101 Gregory st.
Albert Galloway Keller, B.A. Yale University 1896	*Milford, Conn.*	579 P.
George Dwight Kellogg, B.A. Yale University 1895	*Cambridge, Mass.*	572 P.
Edward Gridley Kendall, B.A. Yale University 1895	*New Haven, Conn.*	62 Lake pl.
James Malcolm Kendall, B.A. Bucknell University 1894 and Yale University 1895	*New Haven, Conn.*	62 Lake pl.
Frederick Wilkinson Kilbourne, PH.B. Yale University 1894	*Meriden, Conn.*	Meriden
Edward Martin Kindle, B.A. Indiana University 1893, M.S. Cornell University 1896	*Franklin, Ind.*	45 Lake pl.
Genevieve Bristol Kinne, B.A. Univ. of Michigan 1890	*Ypsilanti, Mich.*	78 Lake pl.
Richard Shelton Kirby, PH.B. Yale University 1896	*Port Chester, N. Y.*	317 Crown st.
Charles Fronefield Kloss, B.A. Pennsylvania College 1894	*Tyrone, Pa.*	62 Lake pl.
David Albert Kreider, PH.D. Yale University 1896	*New Haven, Conn.*	505 Elm st.
Maurice Lacroix, Gymnase de Genève 1887	*Geneva, Switzerland*	1176 Chapel st.
John Edward Lane, B.A. Yale University 1894	*Hadley, Mass.*	Kent Laboratory
Joshua Larson, B.A. Augustana College 1889	*Altona, Ill.*	149 St. John st.
Bertram Augustus Lenfest, B.S. Mass. Inst. Technol. 1890	*New Haven, Conn.*	82 Dickerman st.
Charlton Miner Lewis, B.A. Yale University 1886, LL.B. Columbia College 1889	*New Haven, Conn.*	213 D.
Warren Estelle Lloyd, M.L. Univ. of California 1895	*Berkeley, Cal.*	340 Elm st.

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Edwin Hoyt Lockwood, M.E. Yale University 1892	*New Canaan, Conn.*	150 College st.
Laura Emma Lockwood, M.A. Univ. of Kansas 1894	*Lawrence, Kansas*	78 Dwight st.
Walter Whitney Lounsbury, B.A. Yale University 1894	*New Haven, Conn.*	22 Lincoln st.
Bertha E. Lovewell, B.L. Washburn College 1889	*Topeka, Kansas*	56 Whalley av.
Walter Irenaeus Lowe, B.A. Yale University 1890	*New Haven, Conn.*	238 Whalley av.
Frank Ranney Luckey, B.S. Cornell University 1882, B.D. Yale University 1888	*New Haven, Conn.*	191 Bradley st.
Henry Edwin McDermott, B.A. Yale University 1896	*New Haven, Conn.*	268 Orchard st.
Boynton Wells McFarland, PH.D. Yale University 1896	*New Haven, Conn.*	420 Temple st.
Winfield Scott Manship, B.A. Wesleyan University 1886, B.D. Yale University 1889	*S. Meriden, Conn.*	S. Meriden
Fred Elmer Marble, B.A. University of Rochester 1887	*Wallingford, Conn.*	7 E. D.
William Crosby Marshall, M.E. Yale University 1894	*Cromwell, Conn.*	55 N. S. H.
Arthur Marvin, M.A. Yale University 1896	*New Haven, Conn.*	40 Lake pl.
Matataro Matsumato, B.A. Imperial Univ. of Japan 1893	*Tokyo, Japan*	119 Park st.
James Denman Meeker, B.A. University of California 1891	*San Francisco, Cal.*	574 P.
Alfred Kindred Merritt, B.A. Yale University 1893	*Brainerd, Minn.*	267 L.
Howard Farr Metcalf, PH.B. Yale University 1896	*Holyoke, Mass.*	46 College st.
Edward Eastman Minor, PH.B. Yale University 1896	*New Haven, Conn.*	123 Columbus av.
William Conger Morgan, B.A. Yale University 1896	*Albany, N. Y.*	395 Temple st.
Henry Hotchkiss Murray, PH.B. Yale University 1893	*Viola, Del.*	54 Garden st.
Alfred Goldstein Nadler, B.A. Yale University 1893, M.D. Yale University 1896	*New Haven, Conn.*	122 Olive st.
Theophilus Nelson, PH.B. Yale University 1892	*New Haven, Conn.*	57 Lake pl.
George Henry Nettleton, B.A. Yale University 1896	*Boston, Mass.*	528 P.
Edward Kramer Nicholson, B.A. Yale University 1896	*Bridgeport, Conn.*	Bridgeport

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